RAND Health
1200 South Hayes Street
Arlington, VA 22202-5050

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MedPAC
601 New Jersey Ave., N.W.
Suite 9000
Washington, DC 20001
(202) 220-3700
Fax: (202) 220-3759
www.medpac.gov

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Services Provided in Multiple Ambulatory Settings: A Comparison of Selected Procedures

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SERVICES PROVIDED IN MULTIPLE AMBULATORY SETTINGS:
A COMPARISON OF SELECTED PROCEDURES

BARBARA O. WYNN
ELIZABETH M. SLOSS
CONSTANCE FUNG
LISA R. SHUGARMAN
J. SCOTT ASHWOOD
STEVEN M. ASCH

WR-160

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HEALTH

PREFACE

Technological advances such as improved anesthesia and pain management coupled with health care financing changes have produced a shift in services from inpatient to outpatient settings and increased the volume and complexity of procedures provided in various ambulatory settings. Very little is known about the quality of care implications of the shift from inpatient to ambulatory care and how patient and procedure characteristics vary among ambulatory settings.

The Medicare Payment Advisory Commission (MedPAC) asked RAND to identify high-volume services provided in multiple ambulatory settings, such as physicians' offices, hospital outpatient departments (HOPDs), and ambulatory surgical centers (ASCs) and to identify measures to examine the feasibility of using administrative data to analyze how the nature of a service, the patient characteristics, and outcomes vary by the setting in which the service is provided. These analyses are prerequisites for evaluating quality and policy issues such as the appropriateness of site-of-service payment differentials across ambulatory settings for the same procedure.

In this report, we describe the results of our analysis for three selected high volume procedures performed in multiple ambulatory settings: magnetic resonance (MR) imaging of the head, neck, and brain, cataract surgery, and colonoscopy. Drawing on a review of the clinical literature for these procedures that is described in a separate report, this research involved an expert panel to rate which measures would be most appropriate for investigating variations in these procedures across ambulatory settings. We then used Medicare administrative data to investigate the feasibility of examining differences in outcomes, patient characteristics, and procedure characteristics across multiple ambulatory settings.

The study findings should be of interest to policymakers interested in Medicare payment and quality issues. Health economists and health services researchers may also have an interest in the findings.

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EXECUTIVE SUMMARY

While ambulatory procedures can be performed in a variety of settings, most are performed in three settings: hospital outpatient departments (HOPDs), ambulatory surgical centers (ASCs,) and physician offices. Technological advances such as improved anesthesia and pain management coupled with health care financing changes have produced a shift in services from inpatient to outpatient settings and increased the volume and complexity of procedures provided in ambulatory settings. Very little is known about the quality of care implications of the shift from inpatient to ambulatory care and how patient and procedure characteristics vary among ambulatory settings.

The Medicare Payment Advisory Commission (MedPAC) asked RAND to identify high-volume services provided in multiple ambulatory settings, such as physicians' offices, HOPDs, and ASCs and to identify measures to examine the feasibility of using administrative data to analyze how the nature of a service, the patient characteristics, and outcomes vary by the setting in which the service is provided. These analyses are prerequisites for evaluating quality and policy issues such as the appropriateness of site-of-service payment differentials across ambulatory settings for the same procedure.

In this report, we describe the results of our analysis for three selected procedures: magnetic resonance (MR) imaging of the head, neck, and brain, cataract surgery, and colonoscopy. MedPAC selected the study procedures in consultation with RAND. Together, the procedures account for about 2.4 percent of the volume and 17.0 percent of payments for diagnostic and therapeutic procedures in ambulatory settings exclusive of evaluation and management services, professional anesthesia services, outpatient rehabilitation therapy services and laboratory tests[1]. Drawing on the results of a literature review, the study involved both an expert panel to rate which measures would be most appropriate for investigating variations in these procedures across ambulatory settings and analyses of Medicare administrative data.

[1] This calculation does not include DME, drugs and medical supplies, and outpatient dialysis and accounts only for professional and facility services provided in physician offices, ASCs, HOPDs, and IDTFs.

METHODS AND DATA

We conducted three expert panel meetings, one for each of the selected procedures. We used a modified version of the RAND appropriateness method for the expert panel process (Fitch et al., 2001). Generally, the method quantitatively assesses the expert judgments of a group of clinical experts by using a rating scale ranging from 1 to 9 and a measure of dispersion. Panelists were asked to rate the study procedure on several dimensions: the preventability and severity of selected adverse outcomes, patient characteristics that might affect where care is delivered, and procedure characteristics that might affect the appropriateness of furnishing the services in particular settings to patients at different risk levels.

After the expert panel ratings were compiled, we tested the feasibility of using administrative data to measure differences among the ambulatory settings using 2001 claims data for Medicare fee-for-service beneficiaries. The objectives of these analyses were:

- To examine the extent to which the patient population receiving a procedure and/or the nature of the procedures within that grouping varied by setting.
- To assess the feasibility of identifying complications and adverse outcomes that might occur during or after a procedure using administrative data.
- To identify variables in the administrative data that differentiate characteristics of the service.

RESULTS

MRI of the brain. On the issue of patient characteristics, the panel ratings and discussion indicated that MRIs are low risk procedures that can be safely performed in the different ambulatory settings. The two conditions that might pose risk- acute myocardial infarction (AMI) within the past seven days and automatic implantable cardioverter defibrillator (AICD) implants - were thought to occur very infrequently and this was confirmed by the empirical evidence. The expert panel discussed the issue of generalizability briefly and indicated that it is likely that similar results would be obtained from panels discussing other MRI and magnetic resonance angiography (MRA) procedures, with and without contrast materials.

The empirical data indicated that patients receiving MRI with contrast have higher average HCC risk scores than patients receiving MRI without contrast, suggesting that they are more

medically complex patients.2 However, after controlling for use of contrast media, the pattern of HCC risk scores across the sites is inconsistent. The data indicate that a higher proportion of MRIs with contrast are performed in HOPDs than in community settings. Both general medical outcomes and procedure-specific outcomes occurred at a low rate in all three ambulatory settings following MRI, but differences across the sites are measurable. For all MRIs (with and without contrast), the rates for most outcomes were highest in the office setting. The HOPD rates were slightly lower than rates in the office and the rates for IDTFs were considerably lower.

Cataract Surgery. About 97 percent of procedures within this BETOS category were for a single HCPCS code. Detecting differences in this procedure across settings is problematic because of billing requirements for anesthesia time and materials and bundling of intraocular lenses into the facility payment. On the issue of patient characteristics, the panel ratings and discussion indicated that these are low risk procedures that can be safely performed in either an HOPD or ASC. Nevertheless, there are differences in the patient characteristics. The average HCC risk score is higher among patients having cataract surgery in an HOPD (1.21) than an ASC (1.14) and the prevalence rates for at-risk conditions are consistently higher for all 17 risk factors among patients having the cataract surgery in an HOPD than in an ASC. Adverse outcomes occurred at a low rate following cataract surgery. The analyses found few cataract procedures were performed in physician offices, but the findings for these procedures suggest that further investigation might be warranted. It is difficult to assess how likely these patterns would be to persist in other minor ophthalmologic and non-ophthalmologic surgical procedures.

Colonoscopy. Compared to physician offices, a higher proportion of procedures performed in HOPDs and ASCs involve some lesion removal, biopsy, or control of bleeding. On the issue of patient characteristics, the panel did not reach agreement on the appropriateness of physician offices as the site of care for several types of colonoscopies. Among the patient characteristics that might increase risk, the prevalence rates are higher among patients having the colonoscopy in an HOPD than in an ASC. Although based on extremely small numbers, the prevalence rates of several risk factors are higher among the patients having colonoscopy in the office than in the HOPD. Looking at all colonoscopies combined, the average HCC risk score for those performed in the HOPD (1.08) is higher than those in an office (1.04) or an ASC (1.00). All adverse outcomes

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[2] The hierarchical condition category (HCC) risk adjustment model assigns a risk score based on a beneficiary's expected service use given their demographic characteristics (age, sex, etcetera) and medical conditions relative to that of the national average beneficiary. It can be used to identify patients who are likely to have complex medical needs.

following colonoscopy occurred at a very low rate in all three ambulatory settings with only four with rates above 10 per 1000 (abdominal pain, chest pain, shortness of breath, and hemorrhage). The panel and RAND clinical project staff thought these risk patterns would likely be similar for other elective endoscopic procedures.

EXPERT PANEL

Several crosscutting themes emerged from the panel discussions and ratings that merit highlighting:

- The three study procedures were low-risk procedures that for most patients are appropriately performed across different ambulatory sites as long as the site has properly trained staff and appropriate equipment. There were only a few instances (e.g., MRI with anesthesia or high dose contrast media) in which the panelists agreed it might be inappropriate to furnish the service in community-based settings. The colonoscopy panel was divided on the appropriateness of performing more complex procedures on higher risk patients in office settings.

- While Medicare has different health and safety standards for hospitals, ASCs, physician offices and IDTFs, it is not clear whether these have implications for how care is delivered across these settings. An off-campus hospital outpatient surgery center may be more like a freestanding ASC than the hospital-affiliated ASC that is co-located on the hospital's main campus. Differences between the typical care processes, physician specialties and equipment in an IDTF compared to a physician office are not well understood. State licensure laws and accreditation may be important factors in understanding the differences. For example, several panelists at the colonoscopy panel argued that some state licensure laws require that a physician office performing colonoscopies "look like an ASC" and should not be rated based on a typical physician office. The division among the panel members over the appropriateness of furnishing particular colonoscopies in physician offices may be indicative of different perceptions of the structural characteristics of physician offices where colonoscopies are performed.

- Risk is higher for procedures that require general anesthesia or, for example, high dose contrast media. A MRI panelist noted that the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) had stringent monitoring requirements for the administration of contrast media that might have both cost and quality implications relative to non-JCAHO accredited facilities.

- We asked during the panel meetings whether there were particular patient subgroups that might require additional resources. Each panel provided specific examples but no ratings were solicited on the examples. For example, the MRI panel indicated a patient with claustrophobia was more time-consuming and may require sedatives. Only one or two examples were identified in each panel meeting and the three panels did not identify the same general health conditions.

- The generalizability of the findings to other procedures varied. Panelists felt that the risk patterns elucidated for MRI would likely apply to other MRI and MRA procedures, even though they did not formally evaluate this. Similarly the patterns observed for colonoscopy would likely apply to other elective endoscopic procedures, though the underlying patients characteristics would likely have very different distributions. The cataract panelists found it difficult to ascertain how other minor ophthalmologic procedures would compare to their findings.

EMPIRICAL EVALUATION

The second component of this task was to apply a set of clinically based measures to the claims data for a 5 percent sample of Medicare beneficiaries. Using claims data to examine potential differences in quality and processes of care across ambulatory settings has several advantages. Medicare claims data are routinely collected, available relatively quickly, and are relatively inexpensive to analyze. However, outcomes can be difficult to measure using administrative data because clinical detail is lacking and data elements not directly related to payment might be unreliable.

Using administrative data to examine the study questions involved complex matching of provider and professional claims that had different formats, variables, and reporting requirements.

In the process of matching the facility and professional claims, we were able to match a much higher proportion of records using the beneficiary ID, date of service, and the BETOS code rather than using beneficiary ID, date of service, and the HCPCS code. This indicates that the HCPCS procedure code on the facility claim frequently differs from the HCPCS code on the professional claim and could complicate procedure-specific analyses.[3]

There are also concerns about using claims data for condition-specific analyses because identifying clinical subgroups of patients with ICD-9-CM codes might be problematic. The nomenclature provides only limited indicators of the severity of a condition. This makes identifying specific clinical outcomes following a procedure difficult. For example, the colonoscopy panel noted that some complications could range from minor to severe. Concerned with the potential under-reporting of complications, the panel rated complications with the understanding that only those that are severe are likely to be found in the administrative data. Hospitals tend to report more diagnosis codes in administrative data than community-based settings, which is likely to bias cross-site comparisons.

Attributing outcomes to particular procedures requires the tenuous assumption of causality. Both the cataract and MRI panels expressed concern that conditions following the procedure may be more indicative of ineffective or poor pre-or post-operative care rather than being complications related to the actual procedure. In their ratings, the cataract panel limited the more general health outcomes to those occurring within 7 days compared to a 30-day window for eye-specific complications. Using bleeding as an example, the colonoscopy panel also cautioned that it might be difficult to distinguish a potential complication of the colonoscopy from the underlying symptoms that created the need for the procedure.

In these preliminary analyses, we controlled for major procedure differences that might affect outcomes by separately examining complication rates for MRI with and without contrast media and colonoscopy with and without lesion removal, biopsy, or control of bleeding. (Cataract surgeries were dominated by one procedure code). However, we did not control for differences in patient characteristics across settings that might affect outcomes. For example, the cataract panel suggested it would be important to look at rates for cystoid macular edema separately for diabetic and non-diabetic patients since diabetes make the condition less preventable. For congestive

[3] The Berenson-Eggers Type of Service (BETOS) classification is used to group clinically similar HCPCS procedure codes. The study procedures by HCPCS and BETOS codes are listed in Appendix A.

heart failure, the panelists suggested that the analysis should look for signs of new or worsening congestive heart failure. These are the types of refinements that would need to be made before any conclusions could be made concerning differences in outcomes across ambulatory settings.

One study question was whether there are differences in the nature of the procedure in different settings. Other than differences that are accounted for by the HCPCS codes and modifiers that affect payment (such as whether the surgeon performing cataract surgery also provided the pre- and post-operative care), we found our ability to address this issue through the administrative data was limited. Modifier codes that we thought might have some potential (such as those for interrupted procedure and unusual services) are used infrequently, and their actual use is as likely to reflect coding practices as procedure differences. Moreover, the "unusual services" modifier is in relation to the provider's typical procedure rather than a normative standard and, for example, cannot be used to compare the number of sequences in an MRI. We were not able to use the anesthesia claims to assess whether there are differences in the length of surgical procedures and, because of match rates, results concerning type of anesthesia are also problematic. Finally, the opportunity to examine product differences was also affected by the different payment rules for ambulatory services. For example, we were unable to compare anesthetics across the settings because the anesthetic is bundled into the ASC and HOPD facility payments. One distinction between HOPDs and the other ambulatory settings is that resident training, which may increase the amount of time required to perform the procedure, takes place almost exclusively in HOPD settings.

A related study question was whether administrative data could be used to determine if there are differences in the patient characteristics across the three settings that might affect the resources required to perform the procedure. Enrollment data provide beneficiary-level information on patient demographics (age, sex, race) and factors that might affect the medical complexity of a patient (Medicaid status, entitlement based on disability or end-stage renal disease). The claims history also provides a mechanism to identify patients with particular conditions requiring medical care subject to the limitations discussed above regarding the use of ICD-9-CM codes. The claims history can also be used to assign patients to HCC risk categories that can be used to summarize the patient's medical complexity based on predicted needs. The underlying assumption is that performing a diagnostic or surgical procedure on a medically complex patient or patient with a

particular condition such as dementia may require more resources; however, this is an empirical question that cannot be answered directly with administrative data.

The overall limitations of claims data and of specific variables used in our analysis do not mean that claims data should not be used for clinically-based measures, though confirmation with more clinically detailed methods such as chart review would be desirable. The expert panel ratings and our preliminary empirical analyses for the three procedures suggest that with further refinement the administrative data can be used to reach a number of policy-relevant conclusions that have implications not only for the study procedures but also for other procedures with similar characteristics.

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GLOSSARY

Symbol	Definition
AICD	Automatic implantable cardioverter defibrillator
AMI	Acute myocardial infarction
APC	Ambulatory Payment Classification
ASC	Ambulatory surgical center
CMS	Centers for Medicare and Medicaid Services
COPD	Chronic obstructive pulmonary disease
CRNA	Certified Registered Nurse Anesthetist
DRG	Diagnosis-related group
HCC	Hierarchical Condition Category
HOPD	Hospital outpatient department
ICD-9	International Classification of Disease, 9th Revision,
CM	Clinical Modification
IDTF	Independent diagnostic testing facility
MedPAC	Medicare Payment Advisory Commission
MRA	Magnetic resonance angiography
MRI	Magnetic resonance imaging
MTUS	Miles, Time; Units, Services Count
RBC	Removal, biopsy, or control of bleeding
SAF	Standard Analytic File
SSS	Social and Scientific Systems, Inc.

1. OVERVIEW

While ambulatory procedures can be performed in a variety of settings, most are performed in three settings: hospital outpatient departments (HOPDs), freestanding ambulatory surgical centers (ASCs), and physician offices. Other settings include freestanding independent diagnostic testing facilities (IDTFs), community health centers, and rural health clinics. Technological advances such as improved anesthesia and pain management coupled with health care financing changes have produced a shift in services from inpatient to outpatient settings and increased the volume and complexity of procedures provided in ambulatory settings. Very little is known about the quality of care implications of the shift from inpatient to ambulatory care and how outcomes and patient and procedure characteristics vary across ambulatory settings.

In this section, we summarize the purpose of our study examining services provided in ambulatory settings, discuss the organization of this report, and provide an overview of Medicare coverage and payment policies related to ambulatory services.

OVERVIEW OF STUDY

The Medicare Payment Advisory Commission (MedPAC) asked RAND to identify high-volume services provided in multiple ambulatory settings, such as physicians' offices, HOPDs, and ASCs and to examine the feasibility of using administrative data to analyze how the nature of a service, the patient population, and outcomes vary by the setting in which the service is provided. These analyses are prerequisites for evaluating quality and policy issues such as the appropriateness of site-of-service payment differentials across ambulatory settings for the same procedure.[4] They address a limited set of preliminary questions:

1. Which procedures are provided in more than one ambulatory setting? Which of these are high volume?

[4] While the issue of when care is provided appropriately in an inpatient vs. outpatient setting remains an important issue, the study focus is on the variations in procedures performed in ambulatory settings. Medicare site of service payment differentials for ambulatory procedures may adversely affect beneficiary access to appropriate care or the efficient delivery of needed health care services.

2. Does the medical literature identify the conditions under which certain procedures should be provided in a particular setting or indicate outcomes for particular types of patients are sensitive to where a certain procedure is performed?
3. What outcomes and indicators that can be monitored with administrative data might be used to assess differences in patient characteristics and the processes and quality of care across ambulatory settings for certain procedures?

Our study has involved three sequential tasks. In the initial task, RAND, in conjunction with MedPAC and Social and Scientific Systems, Inc., used Calendar Year 2001 Medicare Part B claims data for a 5% beneficiary sample to identify high volume procedure groupings provided in at least two of four ambulatory settings: ASCs, HOPDs, physician offices, and IDTFs.

MedPAC, in consultation with RAND, then reviewed the high volume procedures to select three procedures for further study. The high volume procedures that were considered potential candidates for further study met two basic criteria:

- the procedure was performed in at least two sites of care (>10% of total volume in each site); and,
- the procedure was among the top 25 multi-site procedures in terms of total volume or expenditures

The objective was to choose a diverse set of high volume study procedures that vary by type (e.g., surgical vs. non-surgical), potential safety concerns, and to include at least the three main ambulatory care settings in the study. The three procedures selected for further study were: ***magnetic resonance imaging (MRI) of the head, neck, and brain***, ***cataract surgery***, and ***colonoscopy***. This set of procedures represents much of the range of issues at the intersection of patient safety and procedure venue for Medicare outpatient procedures. Together, the procedures account for about 2.4 percent of Medicare's volume and 17 percent of its of payments for diagnostic and therapeutic procedures in ambulatory settings exclusive of evaluation and management services, professional anesthesia services, outpatient rehabilitation therapy services

and laboratory tests[5]. When only those procedures performed in multiple ambulatory settings (i.e., at least 10 percent of the time in two different settings) are considered, the procedures represent about 3.4% of Medicare's volume and 20.4 % of its payments.

The second task was an in-depth literature review for the three high-volume procedures selected for further study. The literature review focused on research related to outcome and process indicators for the study procedures, including any studies on the relationship between the setting and patient characteristics, processes of care, and outcomes. The literature reported fairly consistently the set of process measures and major and minor complications for cataract surgery and colonoscopies but only one paper reported process measures for MRI. The literature that we reviewed on each of the three procedures was generally silent on the issue of differences in patient characteristics, process measures, and outcomes of care across settings of care. In general, the literature did not address positive outcomes of care and only a small subset of studies examined the patient characteristics associated with complications of care. The findings from the literature review are reported separately in LShugarman, CFung, HLopez, and BWynn, *Services Provided In Multiple Ambulatory Settings: A Review Of The Literature For Selected Procedures* (2004).

The third and final task, which is the subject of this report, was to explore the feasibility of using administrative data to measure the quality and process indicators and to evaluate the extent to which the patient population and/or the nature of the service within the study procedure groupings vary by setting. Drawing on the results of the literature review, the task involved both expert panels to rate which measures would be most appropriate for investigating variations in these procedures across ambulatory settings and analyses of Medicare administrative data.

MEDICARE SITE OF SERVICE REQUIREMENTS

To participate in the Medicare program, hospitals must meet health and safety standards established by the Centers for Medicare and Medicaid Services (CMS) and any state licensure requirements. Hospitals accredited by the Joint Commission on Accreditation of Healthcare Organizations are deemed to meet these requirements. For coverage and payment purposes, Medicare does not distinguish between clinics and other outpatient facilities that are co-located

[5] This calculation does not include DME, drugs and medical supplies, and outpatient dialysis and accounts only for professional and facility services provided in physician offices, ASCs, HOPDs, and IDTFs.

with the hospital's inpatient services and those that are clinically and financially integrated with the hospital but located off-site. As long as Medicare's conditions of participation and criteria for "provider-based" designation are met, the off-site facility can furnish the same constellation of services and receive the same payment as an on-campus outpatient department.

Freestanding ASCs are also required to meet CMS health and safety standards as well as any applicable state licensure requirements. By definition, an ASC is primarily organized to provide facility services instead of physician or other practitioner services. ASCs must have emergency equipment and personnel trained in its use and an effective process for immediately transferring to a hospital any patient who requires emergency medical care beyond the ASC's capabilities. Medicare pays the ASC for facility services and pays separately for physician services provided in ASCs. Restrictions on the procedures that are eligible for an ASC facility fee are intended to ensure patient safety as well as to encourage the movement of procedures from inpatient settings and to preclude a shift of services from physician offices. Procedures on the list of approved ASC procedures generally meet the following clinical and safety criteria:

- The time needed to perform the procedure should not exceed 90 minutes of surgery time or four hours of recovery time. Anesthesia time should be less than 90 minutes.
- The procedure should *not* generally result in extensive blood loss, require major or prolonged invasion of body categories, directly involve major blood vessels, or be generally emergent or life threatening.

Payment rules for services performed in a physician's office apply when an ASC furnishes services that are not on the approved list of ASC procedures. While there are no coverage limitations on where physician professional services may be performed, there are no non-facility practice expense relative values for surgical services that are essentially performed only in facility settings. For example, there are no non-facility practice expense RVUs for cataract surgery because this procedure is performed in an office setting only a very small percentage of the time.

CMS has established rules regarding the level of physician supervision required for particular diagnostic tests performed in non-hospital settings.[6] These levels are:

[6] Physician supervision is assumed for hospital outpatient services.

- *General supervision*. The procedure is performed under the physician's overall direction and control but the physician's presence is not required while the procedure is being performed.
- *Direct supervision*. The physician must be present in the office suite and immediately available to furnish assistance and direction while the procedure is performed.
- *Personal supervision*. The physician must be in attendance in the room during the performance of the procedure.

MRIs of the head, neck, and brain that involve contrast material require direct supervision by a physician while those that do not involve contrast material require only general supervision. Personal supervision is not required for any MRIs of the head, neck, or brain.

CMS defines an independent diagnostic testing facility (IDTF) as a fixed location, mobile entity, or individual non-physician practitioner that provides diagnostic procedures independent of a physician's office or hospital. For coverage and payment purposes, IDTFs are treated as physician offices and the level of supervision requirement for a diagnostic test in a physician's office also applies to an IDTF. The IDTF must have one or more supervising physicians who evidence proficiency in the performance and interpretation of each type of diagnostic procedure performed by the IDTF and provide ongoing oversight. Non-physician personnel used by the IDTF must demonstrate the basic qualifications to perform the tests and be licensed (or accredited by an appropriate national accrediting body in the absence of a state licensure requirement).

PAYMENT INCENTIVES

Medicare's coverage of ASC procedures beginning in 1982, implementation of the Medicare prospective payment system for acute care inpatient hospital services in 1983, and the growth of Medicare managed care have created financial incentives to shift services to ambulatory settings. More recently, different Medicare payment amounts for the facility component of ambulatory procedures (that is, the prospective payments for hospital outpatient services, the ASC facility rate, and the practice expense component of the physician fee schedule) have raised concerns that financial incentives could influence the choice of ambulatory setting and affect beneficiary access and quality of care as well as Medicare expenditures. The differentials are caused by the payment systems for each setting:

- A prospective payment system for hospital outpatient services was implemented in August 2000 that uses an Ambulatory Payment Classification (APC) system to group clinically coherent sets of procedures that require similar resources. A prospective payment rate for each APC is based on the median cost for the procedures in the group relative to a mid-level clinic visit.
- Medicare pays ASCs for approved ambulatory surgery procedures using 9 payment groups. Rates for these groups are based on facility overhead expenses and procedure-specific charges from a 1986 ASC survey with periodic adjustments for intervening inflation.
- The practice expense component of the physician fee schedule is based on resource-based relative values that take into account employee wages, rent, and equipment and supply costs incurred in performing a procedure. The practice expense relative value units for a particular procedure differ based on whether it is furnished in a facility (e.g., HOPD or ASC) or a physician office.

ORGANIZATION OF THIS REPORT

This report is divided into seven sections. Section 2 provides a summary of the expert panel process. Section 3 follows with a description of our empirical evaluation of Medicare administrative data for beneficiaries receiving one of the study procedures in 2001. The results from both the expert panels and the empirical analyses are then summarized by study procedure in the following sections: Section 4, MRI of the Head, Neck, and Brain; Section 5, Cataract Surgery; and, Section 6, Colonoscopy. Section 7 discusses the overall findings and conclusions from the study. The sections are followed by appendices containing information on the procedures included in the data analyses and summaries of the expert panel ratings on the measures that were considered by the panelists.

2. EXPERT PANEL PROCESS

In this section, we describe the expert panels that were held to rate the study procedures (colonoscopy, cataract surgery, and MRI of the head, neck, and brain). We conducted a separate expert panel for each study procedure. Panelists were asked to rate the study procedure on three dimensions: the preventability and severity of selected outcomes, patient characteristics that might affect where care is delivered, and procedure characteristics that might affect the appropriateness of furnishing the services in particular settings to patients at different risk levels. We begin with an overview of the expert panel process and the rating forms and follow with a discussion of the rating process. The results for each expert panel are discussed in subsequent sections of this report. More detailed descriptions of the panel process, including a summary of the results for all indicators rated by each panel, are found in the appendices. The relevant sections and appendices are:

Procedure	Section	Appendix
MRI of the Head, Neck, and Brain	4	B
Cataract	5	C
Colonoscopy	6	D

OVERVIEW OF THE EXPERT PANEL PROCESS

We used a modified version of the RAND appropriateness method for the expert panel process (Fitch et al., 2001). Generally, the method quantitatively assesses the expert judgments of a group of clinicians by using a scale of values ranging from 1 to 9 and a measure of dispersion. We identified a panel of experts for each procedure by contacting individuals from a list of nominations we received from national medical societies and organizations (see Table 2.1). We formed a separate nine-member panel for each study procedure. In doing so, we sought a balanced representation of individuals from the different specialties involved in the care of patients receiving the procedure who were practicing in both academic and non-academic settings in different geographic regions. The appendix for each study procedure includes a list of the expert panel members for that procedure.

Table 2.1 List of Organizations Contacted for Expert Panel

Name	Provided Nominations
The American Gastroenterological Association	Yes
American College of Gastroenterology	Yes
American Society for Gastrointestinal Endoscopy	Yes
American Gastrointestinal Endoscopic Surgeons	No
American Society of Colon and Rectal Surgeons	Yes
American College of Physicians	Yes
American Medical Association	No—referred to ACP, SGIM
Society of General Internal Medicine	Yes
Society of Gastroenterology Nurses and Associates	Yes
American Academy of Family Physicians	Yes
American Society of Neuroradiology	Yes
American Academy of Neurology	Yes
American Academy of Ophthalmology	Yes
American Ophthalmological Society	No—referred to AAO
American Society of Cataract and Refractive Surgery	Yes
American Society of Anesthesiology	Yes, but RAND staff were unable to confirm participants from the list; alternate candidates from opinion leaders agreed to participate.

Each panelist was sent the literature review applicable for the study procedure along with an initial rating form. Following feedback on the initial ratings, we held a teleconference meeting under the leadership of a facilitator experienced in using the appropriateness method. Although each panel had nine identified participants who returned initial rating forms, the cataract and MRI panels each had one member who did not participate in the telephone meeting. During the meeting, panelists discussed the ratings, focusing on areas of disagreement, and were given the opportunity to modify the rating forms. After the discussion, panelists provided final ratings. Panelists were requested to rate all items, but some did not do so. As discussed in greater detail below and in the appendices, the outcome indicators were rated twice while patient characteristic and appropriateness indicators were rated once and there were slight variations in the process used for each panel. We did not force the panels to achieve consensus.

In addition, panelists were encouraged to briefly synthesize issues apart from the narrower discussion of the ratings. These discussions ranged from whether the findings are generalizable to other procedures and whether certain patient sub-groups might require more resources to any concerns the panelists might have with legal and regulatory issues and payment policies. RAND staff took notes on these discussions and relevant portions are presented in this report in Section 7.

PREVENTABILITY AND SEVERITY OF OUTCOMES

In general, the literature that we reviewed identified complications, rather than outcomes measuring the effectiveness or positive impact of the procedure on patient's health. Drawing on our literature review, we developed a listing of adverse outcomes or complications for each procedure that are potentially identifiable through administrative data. We did not include complications that are identifiable only in the medical record. We sent a rating form with these indicators and instructions to the panelists for the first round ratings. For each indicator, the panelists rated the preventability and severity of the outcome on a scale of 1 to 9. The definitions and scale from the rating form instructions are summarized in Table 2.2. The panelists rated each indicator twice in a two-round "modified Delphi" process. In the first round, the panelists rated the indicators before the meeting, with no interaction among panelists. We compiled the ratings and sent to each panelist an individualized document showing the distribution of all the experts' first round ratings, together with his or her own specific ratings.

Table 2.2 Definition and Scale Used to Rate Preventability and Severity

Dimension	Definition	Scale
Preventability	Likelihood that an outcome can be avoided if the individuals or system involved in delivering care follow standard practices. (Adapted from Hofer and Haywood, 2002).	1 = Not preventable 5 = Somewhat preventable 9 = Definitely preventable
Severity	The potential effect of the outcome of the procedure on the patient's life expectancy and quality of life.	1 = Not severe 5 = Somewhat severe 9 = Very severe

Table 2.3 illustrates the summary rating for an outcome (capsule rupture or posterior capsule tear) during cataract removal that was sent to a member of the cataract panel following compilation of the initial ratings. The 1 to 9 rating scale for the outcome is shown in bold. In parentheses beside the scale, the median and the mean absolute deviation from the median are provided. For preventability, the median was 6.0 and the mean absolute deviation from the median was 1.3. The distribution of the ratings by the panelists is shown above the scale in italics, e.g., one panelist gave a preventability rating of "3" while two panelists rated the complication as "8" on the preventability scale. The ^ indicates the initial rating given by the panelist receiving the

summary. This particular panelist gave the outcome a “3” rating for preventability and a “2” rating for severity.

Table 2.3 Example of Line Item from Initial Round Rating Summary for Outcome Section of the Cataract Panel Rating Form

Outcome	Preventability	Severity
Capsule rupture or posterior capsule tear	*1 1 2 2 1 2* 1 2 3 4 5 6 7 8 9 (6.0, 1.3) ^	*3 2 1 2 1* 1 2 3 4 5 6 7 8 9 (3.0, 1.2) ^

At the teleconference meeting, the panelists were provided an opportunity to modify the rating form and, after discussion, to re-rate the outcomes. Some panelists did not rate all measures. In compiling the final ratings, indicators with median scores in the 1-3 range are classified as low severity or low preventability, those in the 4-6 range as uncertain, and those in the 7-9 range as severe or preventable. The results were defined as uncertain if the ratings were dispersed across all three segments of the rating scale. No agreement was defined as at least two panelists rating the indicator as low severity (or low preventability) and at least two panelists rating the indicator as severe (or preventable). The results for each panel are discussed separately in Sections 4-6.

PATIENT CHARACTERISTICS

One objective of our study was to identify outcomes that vary by outpatient settings and to determine if procedure and patient characteristics vary by the outpatient settings in which the service is provided. For most RAND appropriateness panels, the indicators are derived from the literature review. Because the literature review did not identify patient characteristics that vary by outpatient settings of care, we developed a set of possible indicators related to patient characteristics that could be identified through administrative data. In the initial mailing, panelists were asked to submit a short list of patient characteristics that might affect selection of site of care of the procedure. Based on panelists' suggestions, clinician input from the RAND study team, and medical consultant suggestions, we developed a list of quality indicators related to patient characteristics. We distributed the second section of the final rating form with these indicators to the panelists in advance of the teleconference discussion. During the teleconference, the panelists reviewed the indicators and provided ratings on the risk of performing the procedure in

each setting for each patient characteristic. Using the 1 to 9 scale, low risk was defined as "1" and high risk was defined as "9." Since none of the study procedures are high-risk procedures, the panelists were asked to rate relative risk. Panelists rated the patient characteristic indicators once only.

Below is an example of the rating for patients older than age 70 from the cataract panel. The rating scale is shown in bold and the numbers in italics show the distribution of the panelist ratings. In compiling the ratings, indicators with median scores in the 1-3 range were classified as no risk, those in the 4-6 range as uncertain, and those in the 7-9 range as relatively higher risk. The results were uncertain if the individual ratings were dispersed across the rating scale. No agreement was defined as at least two panelists rating the indicator as no risk and at least two panelists rating the indicator as relatively higher risk. The results for each panel are discussed separately in the sections that follow the overview.

Table 2.4 Example of Line Item for Patient Characteristic Section of Cataract Rating Form

Cataract performed for a patient with the following characteristic (based on information derived from administrative or claims data, not medical records):	Procedure performed in a HOSPITAL OUTPATIENT DEPARTMENT 1=Low risk[7] 9=High risk	Procedure performed in an AMBULATORY SURGICAL CENTER 1=Low risk 9=High risk
Age > 70 years	*3 4* 1 2 3 4 5 6 7 8 9	*3 3* 1 2 3 4 5 6 7 8 9

PROCEDURE CHARACTERISTICS

Another objective of the study was to determine if procedure characteristics vary by the ambulatory settings in which the service is provided. To address this question, the third section of the final rating form was used to rate the appropriateness of performing procedures with certain characteristics in each setting of care on patients at different risk levels. Because the literature review did not identify procedure characteristics that vary by outpatient settings of care, we used the same process to develop the list of procedure characteristics as we used for patient characteristics (see above). Panelists were asked to rate the appropriateness of providing particular procedures to patients at three levels of risk (normal or very low risk, low to moderate

[7] The forms sent to the panelists referenced risk of mortality. However, at each panel meeting, clarifying instructions were provided to request that the rating be based on relative risk.

risk, and moderate risk). We did not use a category for high risk because the study procedures are not likely to be performed on a high- risk patient in an ambulatory setting, if at all. The rating forms defined appropriate as follows:

> A service is judged to be appropriate only if the benefit of the medical action (to the patient) exceeds the risk of the action (to the patient) by a wide enough margin that the service is worth doing (Adapted from Brook et al., 1987).

The rating scale used to define appropriateness was:

> 1=Extremely inappropriate
> 5=Equivocal (neither clearly appropriate nor clearly inappropriate)
> 9=Extremely appropriate

Table 2.5 is an example of the portion of the cataract rating form for procedure characteristics. The example requests appropriateness ratings for performing CPT 66852 on patients in the three risk categories in an HOPD. Another portion of the form asked for the appropriateness ratings in an ASC for the same risk categories. The rating scale is shown in bold and the panelist ratings are italicized.

We distributed the rating forms with the appropriateness indicators and instructions to the panelists in advance of the teleconference discussion. During the teleconference, the panelists reviewed the indicators and provided the appropriateness ratings. In compiling the ratings, indicators with median scores in the 1-3 range are classified as inappropriate, those in the 4-6 range as equivocal, and those in the 7-9 range as appropriate. The results were uncertain if the ratings were dispersed across all three segments of the rating scale. No agreement was defined as at least two panelists rating the indicator as inappropriate and at least two panelists rating the indicator as appropriate. The results for each panel are discussed separately in Sections 4-6. We used the results from the expert panels to inform our empirical evaluation of administrative data for beneficiaries receiving a study procedure in 2001. An overview of these analyses is presented in the next section.

Table 2.5 Illustration of Line Item for Procedure Characteristics Section of Cataract Rating Form

Cataract surgery performed in a HOSPITAL OUTPATIENT DEPARTMENT for a patient undergoing the following type of procedure:	NORMAL OR VERY LOW RISK 1=Extremely inappropriate 5=Equivocal (neither clearly appropriate nor clearly inappropriate) 9=Extremely appropriate	LOW-MODERATE RISK 1=Extremely inappropriate 5=Equivocal (neither clearly appropriate nor clearly inappropriate) 9=Extremely appropriate	MODERATE RISK 1=Extremely inappropriate 5=Equivocal (neither clearly appropriate nor clearly inappropriate) 9=Extremely appropriate
Removal of lens material; pars plana approach, with or without vitrectomy (66852)	*1 1 13* 1 2 3 4 5 6 7 8 9	*1 1 13* 1 2 3 4 5 6 7 8 9	*1 1 112* 1 2 3 4 5 6 7 8 9

3. EMPIRICAL EVALUATION OF MEASURES

After the expert panel ratings were compiled, we tested the feasibility of using administrative data to measure differences in the indicators among the ambulatory settings. The objectives of these analyses were:

- To evaluate the extent to which the patient population receiving a procedure and/or the nature of the procedures within that grouping varied by setting;
- To assess the feasibility of identifying complications and adverse outcomes that might occur during or after a procedure using administrative data; and,
- To identify variables in the administrative data that differentiate characteristics of the service.

We focused on outcome and complication rates and on patient and procedure characteristics identified by the literature review and clinical expert advice for the three study procedures and informed by the expert panel ratings. Below we describe the methods employed to accomplish these objectives, including the data sources, construction of the analytic files, the beneficiary sample definition, and calculation of the measures. The results for the three study procedures are discussed in Sections 4-6.

DATA SOURCES

The enrollment and demographic variables for Medicare beneficiaries for these analyses were derived from the Center for Medicare and Medicaid Services (CMS) 5% Denominator File. SSS assigned HCC risk scores for 2001 using 2000 administrative data.[8] The analyses used data on inpatient and outpatient utilization from Medicare Part A and Part B claims. The variables related to utilization of inpatient and outpatient care by Medicare beneficiaries were extracted from

[8] The HCC model assigns a risk score based on a beneficiary's expected service use given their demographic characteristics (age, sex, etcetera) and medical conditions relative to that of the national average beneficiary. It can be used to identify patients who are likely to have complex medical needs. Such patients may be at higher risk for complications than other patients and may require closer monitoring throughout a surgical procedure and recovery.

claims represented in the 5% Physician/Supplier Standard Analytic File (SAF), the 5% Hospital Inpatient SAF, and the 5% Hospital Outpatient SAF.

FILE CONSTRUCTION

The analytic files for our study contained enrollment data and claims for care (inpatient and outpatient) provided during calendar year 2001 (CY2001) to Medicare beneficiaries who had one of three study procedures between January 1 and December 31, 2001. The three procedures, which we refer to as index procedures, were: MRI of the head, neck, and brain (BETOS I2C), cataract removal/lens insertion (BETOS P4B), and colonoscopy (BETOS P8D). The CPT codes included in each procedure grouping are listed in Appendix A. To be included in the sample, beneficiaries must have had the procedure performed in one of four ambulatory settings:

- Hospital outpatient department (HOPD)
- Ambulatory surgical center (ASC)
- Physician office (Office)
- Independent diagnostic testing facility (IDTF)

Social and Scientific Systems, Inc. (SSS) created extract files containing all records from the 5% Denominator file, the 5% Physician/Supplier SAF, the 5% Inpatient SAF, and the 5% Outpatient SAF for this sample of beneficiaries. From these files, we created four mutually exclusive files for each of the three index procedures. The four files were:

1. Index Procedure File: A standardized record for each index procedure performed during CY2001. Each record in this file represents one index procedure and related services received on the same date as the index procedure and includes variables from the Denominator File and variables that relate to the index procedure from the various SAFs, including diagnoses, provider specialties, and other procedures.
2. Physician/Supplier Claim File: All physician/supplier claims for care received in any setting during CY2001 for beneficiaries with an index procedure performed during CY2001.
3. Inpatient Claim File: All facility claims for care received in an inpatient hospital during CY2001 for beneficiaries with an index procedure performed during CY2001.

4. Hospital Outpatient Claim File: All facility claims for HOPD care received during CY2001 for beneficiaries with an index procedure performed during CY2001.

The claims in Files 2 through 4 do not include the care (i.e., anesthesia and all other care) in the index procedure file. In addition, the care in these files is not necessarily related to the index procedure (e.g., MRI). Claims for durable medical equipment, skilled nursing facilities, home health agencies, and hospice are not included in these analyses.

The index procedure file contains a single fixed length record for each index procedure with a standardized set of variables, regardless of which ambulatory setting the procedure was performed in. A beneficiary can have more than one record in the index procedure file if s/he had more than one index procedure (MRI, cataract surgery, or colonoscopy) on different dates in 2001. The three index files include records for all procedures with the HCPCS (CPT) codes included in the BETOS categories for MRI of the head, neck, and brain (BETOS I2C), cataract removal/lens insertion (BETOS P4B), and colonoscopy (BETOS P8D) (Appendix A). In addition, the cataract file included one code, CPT 66820 [9] that is in BETOS P4E (Eye procedure-other) based on clinical input. All variables in the index procedure file record were derived from one or more claims for the index procedure.

For index procedures performed in an ASC or IDTF, the record generally contains variables from a physician/supplier SAF claim for the facility service and a physician/supplier SAF claim for the related physician services. For index procedures performed in the HOPD, the record generally contains variables from an outpatient SAF claim (i.e., facility) and physician/supplier SAF claim. For index procedures performed in a physician office, the record only contains variables from a physician/supplier SAF claim. Claims for anesthesia services furnished in conjunction with the index procedure in any of the sites were identified in the physician/supplier file and added to the index procedure record.

Variables in the index procedure files included diagnosis and procedure codes from the facility and physician claims, as well as the date of service, modifier codes, and provider specialty for each procedure. The 2001 HCC Risk Score (based on 2000 data) for each beneficiary was merged onto the record from a file created by SSS prior to this project. Separate variables for

[9] Discission of secondary membranous cataract (opacified posterior lens capsule and/or anterior hyaloid); stab incision technique (Ziegler or Wheeler knife).

diagnosis and procedure codes, modifier codes and provider specialty were created for anesthesia-related services. In addition, the time unit counts and base unit count were included for each anesthesia code.

STATISTICAL ANALYSIS

We restricted the sample to beneficiaries who were enrolled in both Part A and Part B of Medicare and were in traditional fee-for-service Medicare for at least one month during CY2001. We excluded beneficiaries who were enrolled in a Medicare managed care organization because utilization data for their inpatient and outpatient care are not available. In calculating each measure, we included all beneficiaries who were enrolled in Medicare fee-for-service for at least one month (the period used in these preliminary analyses to measure adverse outcomes).

MRI (head, neck, and brain) is performed in three ambulatory settings: HOPDs, physician offices, and IDTFs. Cataract removal/lens insertion and colonoscopy are performed in a different three ambulatory settings: HOPDs, ASCs, and physician offices. Using the files described above, we compared numerous characteristics of the beneficiaries and procedures among the ambulatory settings. These included demographic characteristics, the type of procedure, the average HCC risk score, other procedures performed on the same date or included on the same facility or physician claim as the index procedure, diagnoses coded on the facility and physician claims for the index procedure, and provider specialty. For the type of procedure, we first classified MRIs by HCPCS code and then collapsed them into two categories: those with contrast and those without contrast.[10] We also categorized the HCPCS codes for colonoscopies into two categories: those with some lesion removal, biopsy, or control of bleeding (RBC) and those without RBC.[11] We used these collapsed procedure categories for MRI and colonoscopy in calculating the average risk scores. In addition, for each index procedure, we tabulated the number of procedure codes within the same BETOS that reported as being performed on the same day to learn if they were being performed multiple times.

We also calculated the percentage of beneficiaries who exhibited characteristics that might increase their risk of an adverse outcome following the procedure (i.e., risk factors) or

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[10] The HCPCS codes for MRI with contrast are 70541, 70542, 70543, 70545, 70546, 70548, 70549, 70552, and 70553. The HCPCS codes for MRI without contrast are 70544, 70547, and 70551.

[11] The HCPCS codes for RBC colonoscopy are 44389, 44391, 44392, 44393, 44394, 45379, 45380, 45382, 45383, 45384, 45385, and 45387. The HCPCS codes for “non-RBC” colonoscopy are 44388, 45378, and G0105.

characteristics that indicate they should not have the procedure (i.e., contraindications). We developed a list of possible risk factors and contraindications, referred to hereafter as “patient characteristics,” based on clinician input from the RAND team, medical consultant suggestions and the panelists' suggestions.

After the panel meeting, we selected a subset of the patient characteristics for the claims analysis on the basis of the rating results. The panel rated the risk level for patients with the specified characteristic for each of the three ambulatory settings separately. The panel rated each characteristic on a 1-to-9 scale, with 1 being low risk and 9 being high risk. We selected for analysis characteristics with a median risk rating of 4 or higher in any of the three ambulatory settings. Based on this criterion, we selected 8 patient characteristics to be analyzed for MRI (head, neck, and brain), 17 for cataract surgery, and 12 for colonoscopy.[12]

We constructed algorithms to define these measures, specifying the patient characteristic in terms of diagnosis or procedure codes (ICD-9-CM, CPT, and HCPCS), and the time frame preceding the procedure (a time period specified in the patient characteristic wording or, if no time period is specified in the wording of the patient characteristic, from January 1, 2001 until the day preceding the procedure). We searched claims for all settings of care (inpatient, outpatient, ASC, IDTF, and office) to identify each patient characteristic. We calculated the rate for each patient characteristic as a percentage based on the number of procedures with a particular characteristic divided by the number of procedures. The rates were estimated for each setting separately and for all settings combined. We calculated the percentage of beneficiaries who developed an adverse outcome or complication within a specified period after each procedure. We developed a list of outcomes/complications that might occur following each procedure based on the results of the literature review, panelists’ comments prior to the meeting, and the discussion at the expert panel meeting. We tested 16 outcome measures for MRI (head, neck, and brain), 24 for cataract removal/lens insertion, and 18 for colonoscopy.[13] We constructed algorithms to describe the

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[12] One characteristic for colonoscopy that would have been selected based on the panel ratings was not tested in the claims analysis because we were unable to identify diagnosis codes for the algorithm.

[13] Several outcomes (3 for MRI, 3 for cataract surgery, and 1 for colonoscopy) that were rated by the panels were not tested in the claims analysis because we were unable to identify diagnosis codes for the algorithms. For MRI, the outcomes were ocular injury, vasospasm, and vasodilation. The colonoscopy condition was post-polypectomy syndrome and the cataract surgery outcomes were capsule rupture, wound dehiscence, and wound leak. We have not reported congestive heart failure as an outcome because the technical issues related to identifying "new or worsening" congestive heart failure were beyond the scope of our study.

measure, specifying the adverse outcome or complication in terms of diagnosis or procedure codes (ICD-9-CM, CPT, and HCPCS), and the time frame following the procedure within which the outcome occurred (30 days). We looked for the adverse outcome or complication on claims for all settings of care (inpatient, outpatient, ASC, IDTF, and office). We calculated the outcome rates as the number of procedures with a particular adverse outcome within the specified time period divided by the number of procedures expressed as a percentage. These rates were estimated for each setting separately and for all settings combined. For these preliminary analyses, we used the same outcome period for all complications and did not try to distinguish between complications and co-morbid conditions that might have been present when the procedure was performed. The results of our analyses are discussed by type of procedure in the next three sections.

4. MRI OF HEAD, NECK, AND BRAIN

This section summarizes the results from the expert panel and our empirical evaluation of administrative data for Medicare fee-for-service beneficiaries who received an MRI of the head, neck, or brain. These procedures are assigned to BETOS 12C (see Appendix A for a listing of the specific procedures) and account for slightly more than 0.5 percent of Medicare's volume and 2.3 percent of its payments for diagnostic and therapeutic procedures in ambulatory settings (exclusive of evaluation and management services, professional anesthesia services, outpatient rehabilitation therapy services and laboratory tests).[14] MRI of the head, neck and brain was selected as a study procedure because it is a high cost diagnostic procedure that is performed in IDTFs as well as HOPDs and office settings.

Our review of the literature found that in general, MR imaging is associated with relatively few safety concerns. MR imaging is contraindicated for some patients with metallic foreign bodies or implants. Most patients without contraindications who undergo non-contrast cranial MR imaging tolerate the procedure without experiencing adverse events. Patients without contraindications who undergo contrast-enhanced MRI also have few adverse reactions. When patients do experience complications, the complications can be grouped into the following categories: clinical symptoms and signs, changes in vital signs, changes in other parts of the physical exam, and changes in laboratory values. It was not clear in our review of the literature whether the complications could be attributed to the MR procedure or contrast in part because the studies included in this review did not have control groups receiving no MR imaging and/or contrast.

EXPERT PANEL RESULTS

The results of the expert panel rankings for all measures are shown in Appendix B. In this section, we summarize the results and highlight those that suggest there may

[14] This calculation does not include DME, drugs and medical supplies, and outpatient dialysis and accounts only for professional and facility services provided in physician offices, ASCs, HOPDs, and IDTFs.

be differences across the settings in patient characteristics, procedure characteristics, or outcomes.

Patient Characteristics

The expert panel was asked to rate the relative risk of performing an MRI on patients with particular characteristics or conditions in three settings: HOPD, IDTF, and physician office. Reflecting the generally low-risk nature of the MRI, the risk of performing the procedure in any of the settings was most often rated low. The ratings were similar across the settings, with HOPDs rated as having slightly less risk for many procedures. In general, ratings for IDTFs and physician offices were the same. The panel discussion reflected concern that the structural differences, if any, are not clearly defined between IDTF and physician office settings, particularly with respect to the level and type of physician involvement.

Only one condition- myocardial infarction within past 7 days - was rated as posing moderate risk across all three settings. The median ratings for unstable angina in last 3 months and for recent myocardial infarction (more than 7 days and less than 30 days ago) were at the high end of relatively low risk in HOPDs and at the low end of moderate risk in the community settings. Patients with an automatic implanted cardioverter defibrillator (AICD) implant, for which MRI is contraindicated, uniformly received the highest risk ranking. There was no agreement on the relative risk posed by foreign bodies in the eye.

Procedure Characteristics

The MRI panel was asked to rate the appropriateness of performing an MRI with and without contrast dye, with anesthesia, or with high dose contrast media in the different settings. In these ratings, a separate category for emergency room (non-scheduled) MRIs was included in addition to the HOPD. There was agreement that performing an MRI with or without dye in any of the settings was appropriate for patients that are from normal to moderate risk. There was also agreement that performing an MRI with anesthesia was appropriate in a hospital setting but there was no agreement

regarding whether it was appropriate in the community settings. Similarly, the panelists did not agree or had inconclusive ratings for high dose contrast MRI.

Outcomes

The MRI panel was asked to rate 18 potential outcomes associated with an MRI on two dimensions: preventability and severity. The panelists rated no complications as both highly preventable and very severe. Ocular injury was the only complication that the panelists agreed were preventable; there was not agreement on whether death would be preventable. All other complications received low preventability ratings.

There were two complications that the panelists agreed were severe: death and anaphylaxis/anaphylactoid. Panelist ratings were inconclusive regarding the severity of four complications: dyspnea (shortness of breath), ocular injury, seizure and syncopy. Other complications were rated as not severe.

In discussion, the panel indicated that these measures would be generalizable to other MRI and magnetic resonance angiography (MRA) procedures, with and without contrast media.

EMPIRICAL EVALUATION RESULTS

The results of the claims analyses for MRI of the head, neck, and brain (hereafter referred to as MRI) are shown in Tables 4.1 through 4.8 based on a 5 percent sample of Medicare beneficiaries in CY2001. In this sample, a total of 40,497 MRIs were performed on Medicare beneficiaries during CY2001 (Table 4.1). Of MRIs performed in an ambulatory setting, about half are performed in an HOPD (52 percent) and the remaining MRIs are done in the office (36 percent) or an independent diagnostic testing facility (11 percent). A smaller percentage of beneficiaries who are under the age of 65, originally disabled or Medicaid eligible have MRIs performed in the office setting than in an HOPD or IDTF. A higher percentage of MRIs in the HOPD are for African-American beneficiaries than in the office or IDTF.

Seven of the nine geographic regions showed a similar pattern of MRIs by ambulatory setting with the largest percentage performed in an HOPD (43 to 71 percent), followed by office (24 to 37 percent), and IDTF (7 to 20 percent) (Table 4.2).

Two geographic regions exhibit a different distribution of MRIs by ambulatory setting. In New England, a much higher percentage of MRIs are performed in an IDTF (28 percent) than in other regions. In the Middle Atlantic, a smaller percentage of MRIs are performed in the HOPD (31 percent) with a higher percentage in the office (64 percent).

Procedure Characteristics

In the three ambulatory settings combined, almost 58 percent of MRIs were performed with the use of contrast media while in the remaining 42 percent; contrast was not used (Table 4.3). A higher percentage of MRIs were performed with contrast media in the HOPD than in the other two ambulatory sites. More than 62 percent of claims for MRI in the HOPD included at least one HCPCS code indicating an MRI was performed with contrast, compared to 53 percent of MRI claims in the office and in the IDTF.

In the three settings combined, almost 20 percent of the MRI claims in this 2001 sample had more than one MRI procedure within BETOS I2C coded (Table 4.3). This pattern of care differed among settings, however, from 12 percent of the HOPD claims having more than one MRI coded to 28 percent of office claims with multiple MRI codes. While there are modifier codes to distinguish between multiple procedures that are performed in the same session and distinct procedures that are performed on the same day during different sessions, they were reported on only a handful of claims and could not be used to determine whether the procedures were done at the same or different times on the same day.[15]

[15] Generally, only modifier codes needed for particular Medicare payment provisions (e.g., professional component only, location in an urban health professional shortage area) were reported and the modifiers did not add information regarding the nature of the procedure.

Table 4.1 Characteristics of Beneficiaries with MRI of Head, Neck, Brain (BETOW 12C) By Ambulatory Setting, Medicare Fee-for-Service System, 2001

Characteristic	HOPD		Office		IDTF		All Sites	
	N	%*	N	%*	N	%*	N	%*
Total	21,233	100.00	14,712	100	4,552	100	40,497	100
Male	8,340	39.3	5,669	38.5	1,677	36.8	15,686	38.7
Female	12,891	60.7	9,043	61.5	2,875	63.2	24,809	61.3
Age in years at time of procedure								
Under 65	3,183	15.0	1,697	11.5	641	14.1	5,521	13.6
65-69	3,771	17.8	2,622	17.8	830	18.2	7,223	17.8
70-74	4,774	22.5	3,405	23.1	1,004	22.1	9,183	22.7
75-79	4,691	22.1	3,441	23.4	981	21.6	9,113	22.5
80-84	3,069	14.5	2,380	16.2	737	16.2	6,186	15.3
85 and Over	1,745	8.2	1,167	7.9	359	7.9	3,271	8.1
White	19,009	89.5	13,304	90.4	4,116	90.4	36,429	90.0
African-American	1,510	7.1	826	5.6	211	4.6	2,547	6.3
Other	714	3.4	582	4.0	225	4.9	1,521	3.8
Originally disabled	4,599	21.7	2,582	17.6	951	20.9	8,132	20.1
Medicaid eligible for 1 or more months	3,450	16.2	1,770	12.0	795	17.5	6,015	14.9
End-stage renal disease	167	0.8	88	0.6	37	0.8	292	0.7

*Numbers in this column represent percentages of column total.

Source: RAND analysis of the 5 percent Standard Analytic Files of Medicare claims, 2001.

Table 4.2 Percentage of MRI of Head, Neck, and Brain (BETOS 12C) Preformed In Three Ambulatory Settings, Medicare Fee-for-Service, 2001

Census Region***	HOPD		Office		IDTF		All Sites	
	N	%*	N	%*	N	%*	N	%*
Total	21,233	52.4	14,712	36.3	4,552	11.2	40,497	100.00
New England	979	50.6	414	21.4	543	28.0	1,936	4.8
Middle Atlantic	1,941	30.6	4,084	64.4	317	5.0	6,342	15.7
East North Central	4,063	66.4	1,662	27.2	394	6.4	6,119	15.1
West North Central	1,888	66.2	686	24.1	276	9.7	2,850	7.0
South Atlantic	4,567	49.9	3,527	38.5	1,065	11.6	9,159	22.6
East South Central	2,109	71.0	589	19.8	273	9.2	2,971	7.3
West South Central	2,712	61.7	1,108	25.2	573	13.0	4,393	10.8
Mountain	1,084	50.6	790	36.9	269	12.6	2,143	5.3
Pacific	1,802	43.3	1,526	36.7	835	20.1	4,163	10.3

*Numbers in this column represent percentages of row total.

**Numbers in this column represent percentages of column total.

***New England: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont

Middle Atlantic: New Jersey, New York, Pennsylvania

East North Central: Illinois, Indiana, Michigan, Ohio, Wisconsin

West North Central: Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota

South Atlantic: Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia

East South Central: Alabama, Kentucky, Mississippi, Tennessee

West South Central: Arkansas, Louisiana, Oklahoma, Texas

Mountain: Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming

Pacific: Alaska, California, Hawaii, Oregon, Washington

Source: RAND analysis of the 5 percent Standard Analytic Files of Medicare claims, 2001.

Table 4.3 Distribution of MRI Head, Neck, and Brain (BETOS 12C) by HCPCS and Number of Procedures Coded for Same Day By Ambulatory Setting, Medicare Fee-for-Service System, 2001

HCPCS	HCPCS Description	HOPD		Office		IDTF		All Sites	
		N	%*	N	%*	N	%*	N	%*
All	MRI, Brain	21,233	100	14,712	100	4,552	100	40,497	100
	Contrast MRI**	13,199	62.2	7,742	52.6	2,410	52.9	23,351	57.7
	Non-contrast MRI***	8,034	37.8	6,970	47.4	2,142	47.1	17,146	42.3
One procedure		18649	87.8	10582	72.0	3473	76.3	32,704	80.8
70541	Magnetic resonance angiography, head and/or neck, with or without contrast material(s).	226	1.1	41	0.3	9	0.2	276	0.7
70542	MR (eg, proton) imaging, orbit, face, and neck; with contrast material	40	0.2	10	0.1	1	0.0	51	0.1
70543	MR (eg, proton) imaging, orbit, face, and neck; without contrast material, followed by contrast material(s) and further sequences.	232	1.1	201	1.4	66	1.4	499	1.2
70544	MR angiography, head; without contrast material(s)	337	1.6	211	1.4	72	1.6	620	1.5
70545	MR angiography, head; with contrast material(s)	37	0.2	3	0.0	1	0.0	41	0.1
70546	MR angiography, head; without contrast material, followed by contrast material(s) and further sequences.	65	0.3	13	0.1	6	0.1	84	0.2
70547	MR angiography, neck; without contrast material(s)	338	1.6	338	2.3	66	1.4	742	1.8
70548	MR angiography, neck; with contrast material(s)	119	0.6	34	0.2	14	0.3	167	0.4
70549	MR angiography, neck; without contrast material, followed by contrast material(s) and further sequences.	266	1.3	141	1.0	29	0.6	436	1.1
70551	Magnetic resonance (eg, proton) imaging, brain (including brain stem); without contrast material	5,508	25.9	3,877	26.4	1,305	28.7	10,690	26.4
70552	Magnetic resonance (eg, proton) imaging, brain (including brain stem); with contrast material(s).	556	2.6	175	1.2	25	0.5	756	1.9
70553	Magnetic resonance (eg, proton) imaging, brain (including brain stem); without contrast material, followed by contrast material(s) and further sequences.	10,925	51.5	5,538	37.7	1,879	41.3	18,342	45.3
Two procedures		2,009	9.5	2,834	19.3	699	15.4	5,542	13.7
Three procedures		570	2.7	850	5.8	285	6.3	1,705	4.2
Four procedures		5	0.0	269	1.8	57	1.3	331	0.8
Five procedures		0	0.0	172	1.2	38	0.8	210	0.5

*Numbers in this column represent percentages of column total.

**Contrast MRI includes the following HCPCS codes: 70541, 70542, 70543, 70545, 70546, 70548, 70549, 70552, and 70553.

***Non-contrast MRI includes the following HCPCS codes: 70544, 70547, and 70551.

Source: RAND analysis of the 5 percent Standard Analytic Files of Medicare claims, 2001.

In all three settings, the most common codes on records with one procedure were coded as MRI without contrast (CPT 70551), or MRI without contrast followed by with contrast (CPT 70553) (Table 4.3). Among those records with two MRIs coded, the two most commonly performed combinations were (1) MRA without contrast (CPT 70544) and MRI without contrast (CPT 70551), and (2) MRA without contrast (CPT 70544) and MRI without contrast followed by with contrast (CPT 70553).

Radiologists (diagnostic or interventional) perform a high percentage of MRIs in the HOPD (80 percent), and office (88 percent) (Table 4.4).[16] The expert panelists asked what specialties are involved when the MRI is performed in an IDTF. We found that about 65% of MRIs are billed as a global procedure with the IDTF specialty code so that the specialty of the physician supervising the procedure cannot be determined. Separate technical and professional components are billed for about 35% of the procedures. The table reflects the lower incidence of separate claims for professional services in IDTFs. If the specialty distribution in IDTFs were determined solely on the professional claims, radiologists were involved in 84 percent of the procedures. In the IDTF and office settings, a neurologist does most of the remaining MRI procedures. In the HOPD, most of the rest are coded as “multispecialty clinic or group practice.” Overall, residents were reported as performing the procedure under the supervision of a teaching physician on 5 percent of the professional claims for HOPD procedures compared to 0.5 percent and 0.2 percent of claims for procedures performed in physician offices and IDTFs, respectively (data not shown).

[16] The percentage for MRIs performed by a radiologist in the IDTF is much lower because, of the 4,552 MRIs performed in the IDTF, only 1,344 have a professional line item with the index HCPCS.

Table 4.4 Top five Specialties* of Providers Performing MRI of Head, Neck, and Brain (BETOS 12C) By Ambulatory Setting, Medicare Fee-for-Service System, 2001

Setting	Specialty Code	Specialty Description	Number	Percent**
HOPD	30	Diagnostic radiology	16,387	77.2
	70	Multispecialty clinic or group practice	893	4.2
	94	Interventional radiology	501	2.4
	13	Neurology	190	0.9
	92	Radiation oncology	72	0.3
Office	30	Diagnostic radiology	12,762	86.7
	13	Neurology	703	4.8
	70	Multispecialty clinic or group practice	357	2.4
	94	Interventional radiology	245	1.7
	8	Family Practice	119	0.8
IDTF***	30	Diagnostic radiology	1,129	24.8
	13	Neurology	108	2.4
	70	Multispecialty clinic or group practice	68	1.5
	94	Interventional radiology	27	0.6
	92	Radiation oncology	6	0.1

*Specialties were derived from the claims for professional services associated with the procedure.
The percentages do not total 100 percent because they represent only the top five specialties.
**Numbers in this column represent percentages of all procedures performed in the indicated setting.
***About 65 percent of the IDTF records were global bills with no specialist indicated.
Source: RAND analysis of the 5 percent Standard Analytic Files of Medicare claims, 2001.

Patient Characteristics

We used the risk scores assigned to each beneficiary by the hierarchical condition category (HCC) risk adjustment model to determine if more medically complex patients are treated in a particular setting. In each of the sites separately and the three sites combined, the average HCC risk score is higher for patients undergoing MRI with contrast than for MRI without contrast (Table 4.5). For contrast MRIs, the risk scores are highest among HOPD patients followed by office and IDTF patients. For non-contrast MRIs, the pattern is reversed with the risk scores of HOPD patients the lowest, followed by IDTF and office patients.

Table 4.5 Average Risk Scores for Beneficiaries With MRI of Head, Neck, and Brain (BETOS 12C) By Ambulatory Setting, Medicare Fee-for-Service System, 2001

HCPCS	Procedure Category	HOPD	Office	IDTF	All Sites
All	MRI, Brain	1.27	1.25	1.23	1.26
	Contrast MRI*	1.31	1.26	1.24	1.28
	Non-contrast MRI**	1.21	1.24	1.23	1.23

*Contrast MRI includes the following HCPCS codes: 70541, 70542, 70543, 70545, 70546, 70548, 70549, 70552, and 70553.
**Non-contrast MRI includes the following HCPCS codes: 70544, 70547, and 70551.
Source: RAND analysis of the 5 percent Standard Analytic Files of Medicare claims, 2001.

In all three ambulatory settings, the two ICD-9-CM diagnoses coded most frequently on the facility claims for MRIs are dizziness and giddiness (ICD-9-CM 780.4) and headache (ICD-9-CM 784.0)[17] (Table 4.6). The percentage of claims with each of the other eight diagnoses in the top ten varies somewhat among the three settings. A higher percentage of diagnosis codes for MRIs performed in the office and IDTF are related to cerebrovascular disease[18] than in the HOPD (34 percent for office, 31 percent for IDTF, and 23 percent for HOPD).

[17] The diagnoses for the office setting are derived from the professional, rather than the facility, claim.

[18] Cerebrovascular-related diagnoses include the following ICD-9-CM codes: 433.10, 435.9, 436, 331.9, and 437.1.

The prevalence rates of eight characteristics that might increase the risk of an adverse outcome (i.e., risk factors) among patients having an MRI are shown in Table 4.7.[19] Each characteristic was identified using all claims for care received by the patient in any inpatient or outpatient setting during the months and days of 2001 preceding the date of the MRI. The prevalence rates of four risk factors are higher among patients having the MRI in the office than in the HOPD or IDTF: unstable angina, myocardial infarction in past week, intraocular magnetic foreign body, and foreign body after penetrating wound. The prevalence of cerebral edema was higher in HOPD patients than in office or IDTF patients.

Outcomes

Both general medical outcomes and procedure-specific outcomes occurred at a low rate in all three ambulatory settings following MRI (Table 4.8). For all MRIs (with and without contrast), the rates for most outcomes were highest in the office setting. HOPD rates were slightly lower than rates in the office. Both office and HOPD rates were considerably higher than IDTF rates. The overall rates for two outcomes (altered mental status and tachycardia) were highest among HOPD patients. After restricting to contrast MRI only, however, the rate of altered mental status was lower among the HOPD patients than among office patients (data not shown). In addition, the overall rate of anaphylaxis/anaphylactoid reaction was highest among IDTF patients; however, when restricted to MRI with contrast, the rates for this outcome are similar among the HOPD and IDTF patients (data not shown).

[19] As mentioned in the Methods section, the MRI panel rated these characteristics with a median of 4 or higher on a 1-to-9 risk scale, with 9 being high risk.

Table 4.6 Top Ten Diagnoses on Facility Claim* for MRI of Head, Neck, and Brain (BETOS 12C) By Ambulatory Setting, Medicare Fee-for-Service, 2001

ICD-9 Code	ICD-9 Code Description	HOPD		Office		IDTF		All Sites	
		N	%**	N	%**	N	%**	N	%**
780.4	Dizziness and giddiness	2,978	14.0	1,862	12.7	671	14.7	5,511	13.6
784	Headache	2,595	12.2	1,915	13.0	578	12.7	5,086	12.6
433.1	Carotid artery occlusion w/o mention of cerebral infarction	1,134	5.3	1,319	9.0	268	5.9	2,720	6.7
435.9	Unspecified transient cerebral ischemia	1,164	5.5	1,156	7.9	293	6.4	2,612	6.4
436	Acute, but ill-defined, cerebrovascular disease	995	4.7	863	5.9	318	7.0	2,175	5.4
331.9	Cerebral degeneration, unspecified	965	4.5	823	5.6	291	6.4	2,079	5.1
780.9	General symptoms nec	1,081	5.1	563	3.8	195	4.3	1,839	4.5
437.1	Other generalized ischemic cerebrovascular disease	549	2.6	790	5.4	243	5.3	1,582	3.9
781.2	Abnormality of gait	641	3.0	438	3.0	95	2.1	1,174	2.9
780.2	Syncope and collapse	656	3.1	394	2.7	121	2.7	1,170	2.9

*Diagnoses for physician office procedures were derived from professional claims.

**Numbers in this column represent percentages of all procedures performed in the indicated setting. The percentages do not total 100 percent because they represent only the top ten diagnoses. Multiple diagnoses can be coded on a single claim.

Source: RAND analysis of the 5 percent Standard Analytic Files of Medicare claims, 2001.

Table 4.7 Selected Risk Factors of Beneficiaries With MRI of Head, Neck, and Brain (BETOS 12C) By Ambulatory Setting, Medicare Fee-for-Service System, 2001

Indicator*	Risk Factor	HOPD		Office		IDTF		All Sites	
		N	Rate**	N	Rate**	N	RATE**	N	Rate**
BF	Retained (old) intraocular foreign body, magnetic	158	7.4	210	14.3	28	6.2	396	9.8
D	Unstable angina in last 3 months	142	6.7	130	8.8	19	4.2	291	7.2
BC	Cerebral edema	45	2.1	7	0.5	3	0.7	55	1.4
E	Myocardial infarction within past 7 days	6	0.3	11	0.7	0	0.0	17	0.4
BH	Retained (old) foreign body following penetrating wound of orbit (retrobulbar foreign body)	3	0.1	4	0.3	1	0.2	8	0.2
AD	Patient with Automatic Implanted Cardioverter Defibrillator (AICD)	1	0.0	2	0.1	0	0.0	3	0.1
BN	Penetrating wound of orbit with foreign body (open wound of ocular adnexa)	0	0.0	0	0.0	2	0.4	2	0.0
BK	Penetration of eyeball with magnetic foreign body (not old) (open wound of eyeball)	0	0.0	1	0.1	0	0.0	1	0.0

*Letter codes in this column are taken from the rating form for the RAND expert panel. (Reference Appendix B)

**Per 1,000 procedures.

Source: RAND analysis of the 5 percent Standard Analytic Files of Medicare claims, 2001.

Table 4.8 Selected Adverse outcomes Occurring Within 30 Days Following MRI of Head, Neck, and Brain (BETOS 12C) By Ambulatory Setting, Medicare Fee-for-Service System, 2001

Outcome	HOPD		Office		IDTF		All Sites	
	N	Rate**	N	Rate**	N	Rate**	N	Rate**
Dizziness	732	34.5	1,288	87.5	131	28.8	2,151	53.1
Headache	541	25.5	875	59.5	96	21.1	1,512	37.3
Chest pain	610	28.7	462	31.4	61	13.4	1,133	28.0
Seizure	424	20.0	396	26.9	84	18.5	904	22.3
Syncope	399	18.8	420	28.5	58	12.7	877	21.7
Dyspnea	439	20.7	332	22.6	28	6.2	799	19.7
Paresthesia	235	11.1	251	17.1	35	7.7	521	12.9
Bradycardia	150	7.1	112	7.6	15	3.3	277	6.8
Hypotension	75	3.5	68	4.6	9	2.0	152	3.8
Altered Mental Status	39	1.8	22	1.5	4	0.9	65	1.6
Rash	26	1.2	26	1.8	6	1.3	58	1.4
Tachycardia	30	1.4	19	1.3	4	0.9	53	1.3
Other Complications***	9	0.4	8	0.5	1	0.2	18	0.4
Anaphylaxis/anaphylactoid reaction	6	0.3	3	0.2	2	0.4	11	0.3
Hypertension	1	0.0	3	0.2	0	0.0	4	0.1
Death within 1 week	0	0.0	1	0.1	1	0.2	2	0.0

*Numbers in this column represent the number of outcomes.

**Per 1,000 procedures.

*** Other complications are diagnosis codes 998.89 (Other specificied complications of procedures, not elsewhere classified) and 998.9 (Unspecified complication of procedures, not elsewhere classified).

Source: RAND analysis of the 5 percent Standard Analytic Files of Medicare claims, 2001.

SUMMARY OF FINDINGS

The purpose of our analyses was to determine if there are differences in patient characteristics, processes of care, or outcomes that can be measured through administrative data. On the issue of patient characteristics, the panel ratings and discussion indicated that MRIs are low risk procedures that can be safely performed in the different ambulatory settings. The two conditions that might pose risk- AMI within the past 7 days and AICD implant- were thought to be highly unlikely and this is confirmed by the empirical evidence. The empirical data also indicated that patients receiving MRI with contrast have higher average HCC risk scores than those receiving MRI without contrast. Patients receiving MRI in HOPDs have higher risk scores than patients in other ambulatory settings. However, after controlling for use of contrast media, the HCC pattern of risk scores across the sites is inconsistent.

The data indicate that a higher proportion of MRIs with contrast are performed in HOPDs than in community settings. Both general medical outcomes and procedure-specific outcomes occurred at a low rate in all three ambulatory settings following MRI, but differences across the sites are measurable. IDTFs generally had lower complication rates (not risk-adjusted) than HOPDs and physician offices.

5. CATARACT SURGERY

Extracapsular cataract extraction and phacoemulsification with or without intraocular lens implantation are among the most common surgical procedures performed in the United States (National Eye Institute, 2003). Almost all cataract surgeries are performed in a HOPD, ASC or physician's office (Javitt et al. 1994). Medicare spends more on cataract surgery than any other ambulatory surgical procedure, with the procedure accounting for 0.8 percent of Medicare's volume and 10.3 percent of its payments for diagnostic and therapeutic procedures in ambulatory settings (exclusive of evaluation and management services, professional anesthesia services, outpatient rehabilitation therapy services and laboratory tests).[20] Cataract surgery was chosen as a study procedure because it is a high-volume surgical procedure performed in multiple ambulatory settings.

Most cataract removal surgeries are uncomplicated and lead to improved visual acuity and patient satisfaction. In some cases however, postoperative complications arise including retinal detachment, intraocular lens malposition or dislocation, vitreous loss, endophthalmitis, aphakic and pseudophakic bullous keratopathy, iris prolapse, cystoid macular edema, corneal edema, intraocular pressure, chronic uveitis, or vision loss. Other complications may arise from the sedation or anesthesia used during the procedure. Complications arising from local (injected) anesthesia include retrobulbar hemorrhage, globe perforation, strabismus, respiratory arrest, ptosis, and confusion.

EXPERT PANEL RESULTS

The results of the expert panel rankings for all measures are shown in Appendix C. In this section, we summarize the results and highlight those that suggested differences in patient characteristics, procedure characteristics, or outcomes between cataract surgeries performed in HOPDs and ASCs. We did not ask the panelists to rate cataract procedures performed in physician offices given the relatively small volume of

[20] This calculation does not include DME, drugs and medical supplies, and outpatient dialysis and accounts only for professional and facility services provided in physician offices, ASCs, HOPDs, and IDTFs.

procedures performed in this setting and lack of definition regarding how the structural features and processes of surgery performed in the office setting compare to ASCs.

Patient Characteristics

The expert panel was asked to rate the relative risk of performing a cataract surgery on patients with particular characteristics or conditions in HOPDs and ASCs. There was agreement among the panelists that malignant hypertension and recent myocardial infarction (within 30 days) posed relatively high risk in both settings. Several conditions were rated as posing moderate risk: dementia, cardiac dysrhythmias (paroxysmal ventricular tachycardia and persistent severe sinus bradycardia), and history of shock due to anesthesia in which the correct substance was properly administered. Ratings were inconclusive for three conditions: unstable angina in the last 3 months, cardiomyopathy/heart failure/pulmonary edema, and primary pulmonary hypertension. There was agreement that the remaining conditions on the rating form posed little or no risk in either setting.

Procedure Characteristics

The cataract panel was asked to rate the appropriateness of performing various types of cataract surgeries in HOPDs and ASCs on patients at three risk levels: normal or very low risk, low-moderate risk, and moderate risk. With few exceptions, procedures received high appropriateness ratings when performed in either an HOPD or ASC across all patient risk categories. One exception was cataract surgery involving general anesthesia, which the panelists indicated during discussion should rarely occur. Cataract surgery with general anesthesia had an inconclusive rating for moderate risk patients in HOPDs. In ASCs, it was rated as inappropriate for moderate risk patients and equivocal for normal or low-risk patients. Removal of lens material; pars plana approach, with or without vitrectomy also had different ratings across setting. The rating for low-moderate and moderate risk patients in ASCs was inconclusive. During discussion, several panelists expressed concern over whether a retinal specialist would be available during a vitrectomy performed at an ASC.

Outcomes

The cataract panel was asked to rate 27 potential outcomes associated with cataract surgery on two dimensions: preventability and severity. At the panel meeting, the panelists indicated that the post-surgical period for assessing complications should be 30 days for eye-related conditions such as capsule rupture or tear and 7 days for more general medical conditions, such as arrhythmia. Sixteen of the procedures received moderate to high ratings for both preventability and severity. These are shown in bold type in Table 5.9 below.

EMPIRICAL EVALUATION

The results of the claims analyses for cataract surgery are shown in Tables 5.1 through 5.9, based on a 5 percent sample of beneficiaries. A total of 77,572 cataract surgeries were performed for Medicare beneficiaries in the 5 percent sample during CY2001 (Table 5.1). Of cataract surgeries performed in an ambulatory setting, more than half are done in an ASC (52 percent). Most of the remaining procedures are performed in an HOPD (47 percent), with less than 1 percent done in an office setting. Of the cataract surgeries done in an HOPD, a slightly higher percentage are female, age 85 and over, African-American, originally disabled, or Medicaid-eligible compared to ASC surgeries.

In all geographic regions of the United States except the Mountain region, between 40 and 60 percent of cataract surgeries are performed in an HOPD (Table 5.2), with most of the remaining procedures done in an ASC. In the Mountain region, however, the percentage is much lower in the HOPD (27 percent) and much higher in the ASC (73 percent). In all regions, less than one percent of cataract surgeries are performed in a physician office.

Procedure Characteristics

In the three settings combined, less than 2 percent of the cataract surgery claims in this 2001 sample had more than one cataract surgery within BETOS P4B coded (Table 5.3). This pattern of care differed among settings, however, from under 1 percent of the HOPD claims to almost 12 percent of office claims having more than one

cataract surgery code. Of the claims with one procedure, over 96 percent of cataract surgeries performed in any ambulatory setting are coded as 66984 [Extracapsular cataract removal with insertion of intraocular lens prosthesis (one stage procedure), manual or mechanical] (Table 5.3). This one HCPCS code accounts for a slightly lower percentage of cataract surgeries in the office setting (76 percent) than in the other two settings. Among those records with two or more cataract surgery codes, the two codes are usually the same (e.g., 66984 and 66984) and probably result from separate claims for surgical care only and pre-and post-operative care.

Ophthalmologists performed most cataract surgeries, with 88 percent in the HOPD, 92 percent in the ASC, and 77 percent in the office (Table 5.4). Optometrists performed many of the remaining cataract procedures in the three settings, from 2 percent in the HOPD to 22 percent in the office setting (which are likely to have been for pre-and/or post-surgical care only). A higher percentage of professional claims for ASC cataract surgeries reported a modifier indicating only surgical care was provided and another physician provided pre-and post-surgical care (16 percent) than in HOPDs (12 percent) and office (8 percent) (data not shown). One percent of HOPD cataract surgeries were reported as being performed by a resident under the supervision of a teaching physician compared to a few in ASCs (data not shown).

The roles of anesthesiologists and certified nurse anesthetists/anesthesia assistants differed between HOPDs and ASCs for CPT code 66984 (Table 5.5). The specialty for anesthesia line items was reported as anesthesiology 55 percent of the time in HOPDs compared to 45 percent of the time in ASCs while certified registered nurse anesthetist (CRNA)/anesthesia assistant was the reported specialty for 42 percent and 52 percent of the anesthesia line items for HOPD and ASC surgeries, respectively.

An anesthesiologist may personally provide the anesthesia care or may direct CRNAs in up to 4 procedures concurrently. A CRNA may work independently or under the supervision of an anesthesiologist. Modifiers are used to describe the relative roles of the anesthesiologist and CRNA in the anesthesia care provided to a beneficiary. Even though a higher percentage of anesthesiologists are involved in a beneficiary's care in HOPDs, the reported modifiers indicate anesthesiologists personally furnished a

smaller proportion of anesthesia for CPT code 66984 in HOPDs than ASCs (24 percent compared to 30 percent) and provide medical direction of CRNAs in a higher proportion of surgeries performed in HOPDs. CRNAs worked without medical direction from a physician 14 percent of the time in HOPDs, compared to 35 percent of the time in ASCs.

Table 5.1 Characteristics of Beneficiaries With Cataract Surgery (BETOS P4B) By Ambulatory Setting, Medicare Fee-for-Service, 2001

Characteristic	HOPD		ASC		Office		All Sites	
	N	%*	N	%*	N	%*	N	%*
Total	36,623	100.00	40,671	100.00	278	100.00	77,572	100.00
Male	12,838	35.1	15,204	37.4	102	36.7	28,144	36.3
Female	23,784	64.9	25,461	62.6	176	63.3	49,421	63.7
Age in years at time of procedure								
Under 65	1,257	3.4	1,165	2.9	11	4.0	2,433	3.1
65-69	4,938	13.5	5,901	14.5	41	14.7	10,880	14.0
70-74	8,544	23.3	10,087	24.8	58	20.9	18,689	24.1
75-79	10,347	28.3	11,668	28.7	75	27.0	22,090	28.5
80-84	7,308	20.0	7,820	19.2	57	20.5	15,185	19.6
85 and Over	4,229	11.5	4,030	9.9	36	12.9	8,295	10.7
White	32,698	89.3	37,228	91.5	228	82.0	70,154	90.4
African-American	2,534	6.9	1,954	4.8	32	11.5	4,520	5.8
Other	1,391	3.8	1,489	3.7	18	6.5	2,898	3.7
Originally disabled	3,701	10.1	3,641	9.0	26	9.4	7,368	9.5
Medicaid eligible for 1 or more months	4,966	13.6	4,321	10.6	45	16.2	9,332	12.0
End-stage renal disease	327	0.9	325	0.8	7	2.5	659	0.8

*Numbers in this column represent percentages of column total.

Source: RAND analysis of the 5 percent Standard Analytic Files of Medicare claims, 2001.

Table 5.2 Percentage of Cataract Surgeries (BETOS P4B) Performed In Three Ambulatory Settings By Geographic Area, Medicare Fee-for-Service System, 2001

Census Region***	HOPD		ASC		Office		All Sites	
	N	%*	N	%*	N	%*	N	%**
Total	36,623	47.2	40,671	52.4	278	0.4	77,572	100.00
New England	2,063	54.9	1,685	44.9	8	0.2	3,756	4.8
Middle Atlantic	4,977	50.4	4,864	49.2	42	0.4	9,883	12.7
East North Central	7,737	56.2	6,006	43.6	26	0.2	13,769	17.7
West North Central	3,856	58.4	2,720	41.2	22	0.3	6,598	8.5
South Atlantic	7,041	41.5	9,853	58.1	71	0.4	16,965	21.9
East South Central	2,783	44.0	3,505	55.4	37	0.6	6,325	8.2
West South Central	3,552	41.2	5,033	58.4	27	0.3	8,612	11.1
Mountain	1,125	26.5	3,106	73.1	18	0.4	4,249	5.5
Pacific	3,191	48.1	3,419	51.5	23	0.3	6,633	8.6

*Numbers in this column represent percentages of row total.

**Numbers in this column represent percentages of column total.

***New England: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont
Middle Atlantic: New Jersey, New York, Pennsylvania
East North Central: Illinois, Indiana, Michigan, Ohio, Wisconsin
West North Central: Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota
South Atlantic: Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia
East South Central: Alabama, Kentucky, Mississippi, Tennessee
West South Central: Arkansas, Louisiana, Oklahoma, Texas
Mountain: Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming
Pacific: Alaska, California, Hawaii, Oregon, Washington

Source: RAND analysis of the 5 percent Standard Analytic Files of Medicare claims, 2001.

Table 5.3 Distribution of Cataract Surgeries (BETOS P4B)* By HCPCS and Number of Procedures Coded for Same Day By Ambulatory Setting, Medicare Fee-for-Service, 2001

		HOPD		ASC		Office		All Sites	
		N	%**	N	%**	N	%**	N	%**
Total		36560	100	40671	100	265	100	77496	100
One procedure		36283	99.2	39703	97.6	234	88.3	76220	98.4
66830	Removal of secondary membranous cataract (opacified posterior lens capsule and/or anterior hyaloid) with corneo-scleral section, with or without iridectomy (iridocapsulotomy, iridocapsulectomy).	31	0.1	2	0.0	21	7.9	54	0.1
66840	Removal of lens material; aspiration technique, one or more stages.	12	0	31	0.1	0	0	43	0.1
66850	Removal of lens material; phacofragmentation technique (mechanical or ultrasonic) (eg, phacoemulsification), with aspiration.	72	0.2	45	0.1	1	0.4	118	0.2
66852	Removal of lens material; pars plana approach, with or without vitrectomy.	58	0.2	12	0.0	0	0	70	0.1
66920	Removal of lens material; intracapsular.	26	0.1	0	0.0	0	0	26	0
66930	Removal of lens material; intracapsular, for dislocated lens.	20	0.1	5	0.0	0	0	25	0
66940	Removal of lens material; extracapsular (other than 66840, 66850, 66852).	32	0.1	13	0.0	0	0	45	0.1
66982	Cataract surgery, complex (Not in manual)	314	0.9	198	0.5	5	1.9	517	0.7
66983	Intracapsular cataract extraction with insertion of intraocular lens prosthesis (one stage procedure).	126	0.3	80	0.2	0	0	206	0.3
66984	Extracapsular cataract removal with insertion of intraocular lens prosthesis (one stage procedure), manual or mechanical technique (eg, irrigation and aspiration or phacoemulsification).	35330	96.6	39045	96	201	75.8	74576	96.2
66985	Insertion of intraocular lens prosthesis (secondary implant), not associated with concurrent cataract removal.	120	0.3	149	0.4	4	1.5	273	0.4
66986	Exchange of intraocular lens.	142	0.4	123	0.3	2	0.8	267	0.3
Two procedures		272	0.7	856	2.1	20	7.6	1148	1.5
Three procedures		5	0	82	0.2	8	3	95	0.1
Four procedures		0	0	18	0	3	1.1	21	0
Five procedures		0	0	12	0	0	0	12	0

*Excluded from this table are 77 procedures coded as 66820 (Discission of secondary membranous cataract (opacified posterior lens capsule and/or anterior hyaloid); stab incision technique (Ziegler or Wheeler knife)).

**Numbers in this column represent percentages of column total.

Source: RAND analysis of the 5 percent Standard Analytic Files of Medicare claims, 2001.

Table 5.4 Top Five Specialties* of Providers Performing Cataract Surgery (BETOS P4B) By Ambulatory Setting, Medicare Fee-for-Service System, 2001

Setting	Specialty Code	Specialty Description	Number	Percent**
HOPD	18	Ophthalmology	32,138	87.8
	70	Multispecialty clinic or group practice	1,073	2.9
	41	Optometry	838	2.3
	12	Osteopathinc manipulative therapy	17	0.0
	26	Psychiatry	15	0.0
ASC	18	Ophthalmology	37,458	92.1
	41	Optometry	1,227	3.0
	70	Multispecialty clinic or group practice	844	2.1
	4	Otolaryngology	51	0.1
	79	Addiction medicine	36	0.1
Office***	18	Ophthalmology	214	77.0
	41	Optometry	60	21.6
	70	Multispecialty clinic or group practice	3	1.1
	26	Psychiatry	1	0.4

*Specialties were derived from the claims for professional services associated with the procedure.

**Numbers in this column represent percentages of all procedures performed in the indicated setting. The percentages do not total 100 percent because they represent only the top five specialties.

***Only four specialties were listed on the claims for office procedures.

Source: RAND analysis of the 5 percent Standard Analytic Files of Medicare claims, 2001.

Table 5.5 Anesthesia Services Related to Cataract Surgery By Ambulatory Setting, Medicare Fee-for-Service System, 2001

		% of Anesthesia Line Items		
Specialty Code	Specialty	All Settings	HOPD	ASC
5	Anesthesiology	51.0	54.9	46.4
43	CRNA/ Anesthesia assistant	46.7	42.1	52.1
70	Multispecialty clinic or group practice	1.5	2.3	0.6
Various	Other	0.8	0.7	1.0
HCPCS Modifier Code	Description	All Settings	HOPD	ASC
QS	Monitored anesthesia care service	52.4	55.8	48.3
AA	Anesthesia services personally performed by anesthesiologist	27.1	24.3	30.4
QZ	CRNA service: without medical direction by a physician	23.4	13.5	35.2
QX	CRNA service: medical direction by a physician	22.7	28.6	15.5
QK	Medical direction 2-4 concurrent procedures	20.2	27.3	11.8
QY	Clinical nurse specialist; team member	3.2	3.1	3.4
AD	Medical supervision by physician: more than 4 concurrent procedures	0.7	1.0	0.3

*Numbers in the columns represent percentages of all procedures performed in the indicated setting that had an anesthesia claim.
Source: RAND analysis of the 5% standard Analytic Files of Medicare Claims, 2001.

Patient Characteristics

For the most frequently performed procedure (CPT 66984), the average HCC risk score is highest among patients having cataract surgery in the office (1.36) followed by patients in an HOPD (1.21) and an ASC (1.14) (Table 5.6). This pattern among the three settings also holds for several of the other cataract surgery categories.

In the HOPD, ASC, and office, the most frequently coded diagnosis on facility claims for cataract surgery is senile nuclear cataract (ICD-9-CM 366.16), accounting for

34 to 49 percent of the procedures. Several other cataract diagnoses are coded with widely varying frequency in the three sites[21] (Table 5.7). Two co-morbid diagnoses, hypertension (ICD-9-CM 401.9) and diabetes mellitus (ICD-9-CM 250.00), were coded much more frequently on HOPD facility claims than on ASC or office claims.

The prevalence rates of 17 characteristics that might increase the risk of an adverse outcome among patients (i.e., risk factors) having cataract surgery are shown in Table 5.8.[22] Each characteristic was identified using all claims for care received by the patient in any inpatient or outpatient setting during the months and days of 2001 preceding the date of the cataract surgery. The prevalence rates are consistently higher for all 17 risk factors among patients having the cataract surgery in an HOPD than in an ASC. Although based on extremely small numbers, the prevalence rates of some risk factors are even higher among the office patients than among the HOPD patients.

Outcomes

Adverse outcomes occurred at a low rate following cataract surgery (Table 5.9). Most outcomes occurred more frequently among HOPD patients than among ASC patients. Although the office-based outcome rates are based on very small numbers of events, they are higher than rates in the other two settings. This finding warrants further study.

[21] The diagnoses for the office setting are derived from the professional, rather than the facility, claim.

[22] As mentioned in the Methods section, the cataract surgery panel rated these characteristics with a median of 4 or higher on a 1-to-9 risk scale, with 9 being high risk.

SUMMARY OF FINDINGS

About 97 percent of procedures within this BETOS category were for a single HCPCS code. Detecting differences in the procedure across settings is problematic because of billing requirements for anesthesia time and materials and bundling of intraocular lenses into the facility payment. It is possible, however, to measure differences in who is providing anesthesia and whether one or more physicians are involved in the patient's care. On the issue of patient characteristics, the panel ratings and discussion indicated that these are low risk procedures that can be safely performed in either an HOPD or ASC. Nevertheless, there are differences in the patient characteristics. The average HCC risk score is higher among patients having cataract surgery in an HOPD (1.21) than an ASC (1.14) and the prevalence rates are consistently higher for all 17 risk factors among patients having the cataract surgery in an HOPD than in an ASC. Adverse outcomes occurred at a low rate following cataract surgery. The analyses found few cataract procedures are performed in physician offices, but the rate of adverse outcomes for these procedures suggests that further investigation might be warranted.

Table 5.6 Average Risk Scores With Cataract Surgery (BETOS P4B) By Ambulatory Setting, Medicare Fee-for-Service System, 2001

HCPCS	HCPCS Description	HOPD	ASC	Office	All Sites
All	Cataract	1.21	1.14	1.39	1.17
66820	Discission of secondary membranous cataract (opacified posterior lens capsule and/or anterior hyaloid); stab incision technique (Ziegler or Wheeler knife).	1.08	NA	1.69	1.18
66830	Removal of secondary membranous cataract (opacified posterior lens capsule and/or anterior hyaloid) with corneo-scleral section, with or without iridectomy (iridocapsulotomy, iridocapsulectomy).	1.17	2.19	1.48	1.33
66840	Removal of lens material; aspiration technique, one or more stages.	1.03	1.20	NA	1.16
66850	Removal of lens material; phacofragmentation technique (mechanical or ultrasonic) (eg, phacoemulsification), with aspiration.	1.56	1.14	2.69	1.42
66852	Removal of lens material; pars plana approach, with or without vitrectomy.	1.34	0.78	NA	1.22
66920	Removal of lens material; intracapsular.	1.35	NA	NA	1.35
66930	Removal of lens material; intracapsular, for dislocated lens.	1.33	0.66	NA	1.23
66940	Removal of lens material; extracapsular (other than 66840, 66850, 66852).	1.26	1.40	NA	1.30
66982	Cataract surgery, complex (Not in manual)	1.24	1.35	1.07	1.28
66983	Intracapsular cataract extraction with insertion of intraocular lens prosthesis (one stage procedure).	1.43	0.98	NA	1.25
66984	Extracapsular cataract removal with insertion of intraocular lens prosthesis (one stage procedure), manual or mechanical technique (eg, irrigation and aspiration or phacoemulsification).	1.20	1.14	1.36	1.17
66985	Insertion of intraocular lens prosthesis (secondary implant), not associated with concurrent cataract removal.	1.54	1.21	1.98	1.36
66986	Exchange of intraocular lens.	1.12	1.29	0.74	1.20

NA=Not available; zero patients in cell.

Source: RAND analysis of the 5 percent Standard Analytic Files of Medicare claims, 2001.

Table 5.7 Top Ten Diagnoses on Facility Claim* for Cataract Surgery (BETOS P4B) By Ambulatory Setting, Medicare Fee-for-Service System, 2001

ICD-9 Code	ICD-9 Code Description	HOPD		ASC		Office		All Sites	
		N	%**	N	%**	N	%**	N	%**
366.16	Senile nuclear cataract	12,452	34.0	19,957	49.1	106	38.1	32,499	41.9
366.9	Cataract NOS	11,924	32.6	4,785	11.8	12	4.3	16,720	21.6
401.9	Essential hypertension, unspecified	12,209	33.3	892	2.2	4	1.4	13,104	16.9
366.1	Senile cataract NOS	4,391	12.0	5,977	14.7	47	16.9	10,410	13.4
366.17	Mature Cataract	2,336	6.4	3,728	9.2	18	6.5	6,080	7.8
366.19	Senile Cataract NEC	2,202	6.0	2,852	7.0	26	9.4	5,078	6.5
250	DM w/o compl, type II or unspecified type, not stated as uncontrolled	3,714	10.1	330	0.8	5	1.8	4,049	5.2
366.15	Cortical senile cataract	1,170	3.2	2,083	5.1	20	7.2	3,273	4.2
366.14	Post subcap senile cataract	1,402	3.8	1,719	4.2	8	2.9	3,129	4.0
366.8	Cataract NEC	1,818	5.0	201	0.5	1	0.4	2,020	2.6

*Diagnoses for physician office procedures were derived from professional claims.
**Numbers in this column represent percentages of all procedures performed in the indicated setting. The sum of the percentages might exceed 100 percent because multiple diagnoses can be coded on a single claim.
Source: RAND analysis of the 5 percent Standard Analytic Files of Medicare claims, 2001.

Table 5.8 Selected Risk Factors of Beneficiaries With Cataract Surgery (BETOS P4B) By Ambulatory Setting, Medicare Fee-for-Service System, 2001

Indicator*		HOPD		ASC		Office		All Sites	
		N	Rate**	N	Rate**	N	Rate**	N	Rate**
N	Cardiomyopathy/heart failure/pulmonary edema with hospitalization or emergency department visit within past	2,048	55.9	1,615	39.7	24	86.3	3,687	47.5
I	Dementia	360	9.8	172	4.2	8	28.8	540	7.0
BF	Dislocation of lens	265	7.2	184	4.5	1	3.6	450	5.8
AG	Persistent severe sinus bradycardia or sick sinus tachycardia-bradycardia syndrome	254	6.9	192	4.7	3	10.8	449	5.8
G	Myocardial infarction (>30 days but fewer than 6 months)	149	4.1	124	3.0	4	14.4	277	3.6
D	Unstable angina in last 3 months	173	4.7	99	2.4	3	10.8	275	3.5
X	Malignant hypertension	130	3.5	125	3.1	4	14.4	259	3.3
AC	Paroxysmal Ventricular Tachycardia	134	3.7	90	2.2	1	3.6	225	2.9
Y	Primary pulmonary hypertension	54	1.5	26	0.6	0	0.0	80	1.0
BD	Pseudoexfoliation of lens capsule	40	1.1	6	0.1	3	10.8	49	0.6
F	Recent myocardial infarction (> 7 days but fewer than 30 days)	29	0.8	16	0.4	0	0.0	45	0.6
BJ	Posterior synechiae	19	0.5	4	0.1	0	0.0	23	0.3
BB	Subluxation of lens	12	0.3	7	0.2	0	0.0	19	0.2
E	Myocardial infarction within past 7 days	9	0.2	4	0.1	0	0.0	13	0.2
BE	Progressive high (degenerative) myopia/malignant myopia	7	0.2	1	0.0	0	0.0	8	0.1
AS	History of shock due to anesthesia in which correct substance was properly administered	1	0.0	0	0.0	0	0.0	1	0.0
BC	Recession of chamber angle	1	0.0	0	0.0	0	0.0	1	0.0

*Letter codes in this column are taken from the rating form for the RAND expert panel. (Refer to Appendix C)

**Per 1,000 procedures.

Source: RAND analysis of the 5 percent Standard Analytic Files of Medicare claims, 2001.

Table 5.9 Selected Outcomes Occurring Within 30 Days Following Cataract Surgery (BETOS P4B) By Ambulatory Setting, Medicare Fee-for-Service System, 2001

Outcome***	HOPD		ASC		Office		All Sites	
	N*	Rate**	N*	Rate**	N*	Rate**	N*	Rate**
Other complications****	394	10.8	141	3.5	5	18.0	540	7.0
Stroke	286	7.8	195	4.8	3	10.8	484	6.2
Retained nuclear fragment (posterior chamber v anterior chamber)	214	5.8	255	6.3	4	14.4	473	6.1
Myocardial infarction	131	3.6	93	2.3	5	18.0	229	3.0
Nausea and vomiting	123	3.4	75	1.8	2	7.2	200	2.6
Secondary glaucoma	124	3.4	28	0.7	2	7.2	154	2.0
Arrythmia	105	2.9	42	1.0	3	0.0	150	1.9
Endophthalmitis	65	1.8	47	1.2	1	3.6	113	1.5
Dislocated ocular lenses	75	2.0	31	0.8	2	7.2	108	1.4
Cataract fragments in eye	49	1.3	41	1.0	2	7.2	92	1.2
Iris prolapse	46	1.3	16	0.4	0	0.0	62	0.8
Hypotension	30	0.8	28	0.7	1	3.6	59	0.8
Retinal detachment (complicated v uncomplicated surgery)	39	1.1	19	0.5	0	0.0	58	0.7
Persistent corneal edema	28	0.8	25	0.6	1	3.6	54	0.7
Vitreous loss	30	0.8	20	0.5	4	14.4	54	0.7
Persistent iridocyclitis	28	0.8	12	0.3	1	3.6	41	0.5
Respiratory failure from surgery	16	0.4	5	0.1	1	3.6	22	0.3
Hyphema	13	0.4	7	0.2	0	0.0	20	0.3
Persistent cystoid macular edema (Diabetic v non-diabetic)	13	0.4	5	0.1	0	0.0	18	0.2
Aspiration pneumonia	7	0.2	9	0.2	0	0.0	16	0.2
Ocular hypertension	5	0.1	5	0.1	0	0.0	10	0.1
Retinal break	1	0.0	6	0.1	0	0.0	7	0.1
Hypertension	1	0.0	2	0.0	0	0.0	3	0.0

*Numbers in this column represent the number of outcomes.

**Per 1,000 procedures.

***Outcomes shown in bold were rated at least moderately severe amd somewhat preventable by the cataract expert panel. The panel also gave these ratings to death, wound leak, iris/pupil deformation, and poor ocular motility, excluding cranial VII palsy.

**** Other complications are diagnosis codes 996.5 (Mechanical complications of other specified prosthetic device, implant, and graft, 998.0-998.9 (Other complications of procedures NEC) and V45.6 (States following eye surgery: Cataract extractor, Filtering bleb, Surgical eyelid adhesion -Excludes: aphakia (379.31) artificial: eye globe (V43.0) lens (V43.1)).

No cases were found where death, poor ocular motility, or iris/pupil deformation were reported as a complication.

Source: RAND analysis of the 5 percent Standard Analytic Files of Medicare claims, 2001.

6. COLONOSCOPY

In this section, we summarize the results from the expert panel and our empirical evaluation of administrative data for colonoscopy procedures. Colonoscopy is a commonly performed procedure used to screen for colorectal cancer but it is also used to diagnose the causes of symptoms such as bleeding or unexplained changes in bowel habits, which may be caused by cancer or some other disease/condition. Therapeutic colonoscopies can be performed to remove polyps and to treat bleeding in the colon. Generally, the procedure is performed under some level of sedation and/or with pain medication. In 2001, colonoscopies accounted for about 1.1 percent of Medicare's volume and 4.4 percent of its payments for ambulatory procedures (exclusive of anesthesia and evaluation and management services, outpatient rehabilitation services and laboratory tests).[23] Colonoscopy was selected as a study procedure because it is a high volume surgical procedure performed in three ambulatory settings: HOPDs, ASCs, and physician offices.

Most colonoscopies are uncomplicated and effectively diagnose and treat various gastrointestinal conditions. In some cases however, intra-operative and post-operative complications arise including most commonly perforation, bleeding, pain, and abdominal discomfort. Complications unrelated to the colon but often associated with sedation include:oxygen desaturation, hypertension, hypotension, arrhythmias, and bradycardia. Complications of the colonoscopy procedure may lead to hospitalization and in rare cases, death.

EXPERT PANEL RESULTS

The results of the expert panel rankings for all measures are shown in Appendix D. In this section, we summarize the results and highlight those that suggested differences in patient characteristics, procedure characteristics, or outcomes for colonoscopies performed across the three ambulatory settings.

[23] This calculation does not include DME, drugs and medical supplies, and outpatient dialysis and accounts only for professional and facility services provided in physician offices, ASCs, HOPDs, and IDTFs.

Patient Characteristics

The expert panel was asked to rate the relative risk of performing a colonoscopy on patients with particular conditions. The risk of performing the procedure in any of the settings was most often rated low and there were only slight differences in the ratings across the settings. As a general pattern, the median rating for physician offices was higher than for either hospital outpatient settings or ASCs. However, there was no agreement on the appropriateness rating for physician office for a number of conditions, i.e., at least two members rated the procedure as relatively low-risk while at least two others rated the procedure as relatively high risk. The ratings may reflect differences in panelist assumptions regarding whether staffing and resources in physician office performing colonoscopies are comparable to those in ASCs. This issue was raised during the panel discussion.

For some conditions (e.g., recent myocardial infarction more than 30 days ago but within 6 months) performing the procedure in ASCs was rated as posing slightly less risk than HOPDs, while the converse occurred for other conditions (e.g., COPD with hospitalization or emergency department visit within past one year). In their discussions, the panelists appeared to be weighing the benefits of having immediately available emergency services versus generally less stressful patient environment in an ASC.

No conditions were rated as posing high risk in any of the settings. The ratings were inconclusive or reflected no agreement for several conditions in at least two sites: myocardial infarction within the past 7 days, orthopnea, persistent severe sinus bradycardia or sick sinus tachycardia-bradycardia syndrome, orthostatic hypotension and malignant hypertension.

Procedure Characteristics

The colonoscopy panel was asked to rate the appropriateness of performing various types of colonoscopies in the different settings on patients at three risk levels: normal or very low risk, low-moderate risk, and moderate risk. For HOPDs, all procedures were rated as highly appropriate with the exception of colonoscopies with dilation of stricture without fluoroscopy, which had an inconclusive rating across all three patient risk levels. Colonoscopy with dilation of the stricture with fluoroscopy also had

inconclusive ratings in ASCs. Other procedures with inconclusive ratings in ASCs were: colonoscopy with lesion removal or with endoscopic mucosal resection (all patient risk categories); colonoscopy with stent (low-moderate and moderate risk patients); and colonoscopy with submucuous injection (moderate risk patients).

The appropriateness ratings for colonoscopies performed in physician offices reflect disagreement within the panel on whether the procedures should be performed in this setting. There was either no agreement or an inconclusive rating on nearly all procedures. The panel members agreed that the following procedures were appropriately performed on patients with normal to low-moderate risk in a physician office: colonoscopy with biopsy, colonoscopy with polypectomy involving the ascending colon, and colonoscopy with snare.

Outcomes

The colonoscopy panel was asked to rate 19 potential outcomes associated with a colonoscopy on two dimensions: preventability and severity. There was agreement that chest pain was moderately preventable; there was either no agreement or inconclusive preventability ratings for the remaining outcomes. There was agreement that a number of outcomes were moderately or quite severe. These were: death, hemorrhage, hypoxia, perforation, post-polypectomy syndrome, endocarditis, sepsis, small bowel obstruction, splenic rupture or trauma, and vasovagal reactions.

EMPIRICAL EVALUATION RESULTS

The results of the claims analyses for colonoscopy are shown in Tables 6.1 through 6.8. Based on a 5 percent sample of beneficiaries, a total of 90,890 colonoscopies were performed for Medicare beneficiaries during CY2001 (Table 6.1). Of colonoscopies performed in an ambulatory setting, most were done in an HOPD (70 percent). Most of the remaining procedures are performed in an ASC (26 percent), with 4 percent done in an office. The distributions of colonoscopies by age, gender, and race are similar for procedures in the three settings. Of the colonoscopies done in an HOPD, slightly higher percentages are originally disabled or dual eligible beneficiaries compared to ASC colonoscopies.

Most geographic regions in the United States show similar distributions of colonoscopy by setting, with 60 to 70 percent performed in an HOPD and another 30 to 40 percent in an ASC (Table 6.2). The exceptions to this pattern are New England, East North Central, and West North Central with more colonoscopies performed in the HOPD, and the Middle Atlantic with more procedures done in an office setting.

Table 6.1 Characteristics of Beneficiaries with Colonoscopy (BETOS P8D) By Ambulatory Setting, Medicare Fee-for-Service System, 2001

Characteristic	HOPD		ASC		Office		All Sites	
	N	%*	N	%*	N	%*	N	%*
Total	63,372	100.00	23,503	100.00	4,015	100.00	90,890	100.00
Male	27,658	43.7	10,241	43.6	1,809	45.1	39,708	43.7
Female	35,703	56.3	13,260	56.4	2,206	54.9	51,169	56.3
Age in years at time of procedure								
Under 65	5,578	8.8	1,593	6.8	323	8.0	7,494	8.2
65-69	15,038	23.7	6,066	25.8	1,022	25.5	22,126	24.3
70-74	17,023	26.9	6,505	27.7	1,154	28.7	24,682	27.2
75-79	13,971	22.0	5,416	23.0	876	21.8	20,263	22.3
80-84	8,194	12.9	2,792	11.9	459	11.4	11,445	12.6
85 and Over	3,568	5.6	1,131	4.8	181	4.5	4,880	5.4
White	56,980	89.9	21,313	90.7	3,433	85.5	81,726	89.9
African-American	4,480	7.1	1,453	6.2	301	7.5	6,234	6.9
Other	1,912	3.0	737	3.1	281	7.0	2,930	3.2
Originally disabled	9,540	15.1	2,782	11.8	574	14.3	12,896	14.2
Medicaid eligible for 1 or more months	7,222	11.4	1,965	8.4	333	8.3	9,520	10.5
End-stage renal disease	427	0.7	125	0.5	23	0.6	575	0.6

*Numbers in this column represent percentages of column total.

Source: RAND analysis of the 5 percent Standard Analytic Files of Medicare claims, 2001.

Table 6.2 Percentage of Colonoscopies (BETOS P8D) Performed in Three Ambulatory Settings By Geographic Area, Medicare Fee-for-Service, 2001

Census Region***	HOPD		ASC		Office		All Sites	
	N	%*	N	%*	N	%*	N	%**
Total	63,372	69.7	23,503	25.9	4,015	4.4	90,890	100.00
New England	4,211	86.5	607	12.5	48	1.0	4,866	5.4
Middle Atlantic	9,393	69.1	2,143	15.8	2,050	15.1	13,586	14.9
East North Central	12,258	78.2	3,147	20.1	261	1.7	15,666	17.2
West North Central	5,740	81.5	1,125	16.0	182	2.6	7,047	7.8
South Atlantic	13,238	63.0	7,215	34.3	574	2.7	21,027	23.1
East South Central	4,627	69.6	1,960	29.5	65	1.0	6,652	7.3
West South Central	6,163	68.8	2,666	29.8	129	1.4	8,958	9.9
Mountain	2,641	61.5	1,537	35.8	117	2.7	4,295	4.7
Pacific	4,794	59.6	3,023	37.6	223	2.8	8,040	8.8

*Numbers in this column represent percentages of row total.

**Numbers in this column represent percentages of column total.

***New England: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont
Middle Atlantic: New Jersey, New York, Pennsylvania
East North Central: Illinois, Indiana, Michigan, Ohio, Wisconsin
West North Central: Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota
South Atlantic: Delaware, DC, Florida, Georgia, Maryland, N. Carolina, S. Carolina, Virginia, W. Virginia
East South Central: Alabama, Kentucky, Mississippi, Tennessee
West South Central: Arkansas, Louisiana, Oklahoma, Texas
Mountain: Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming
Pacific: Alaska, California, Hawaii, Oregon, Washington

Source: RAND analysis of the 5 percent Standard Analytic Files of Medicare claims, 2001.

Procedure Characteristics

In all three sites combined, 54 percent of colonoscopies involved some lesion removal, biopsy, or control of bleeding (RBC) procedures while the remaining 46 percent were non-RBC procedures (Table 6.3). The pattern of more RBC colonoscopies holds for the HOPD or ASC settings, but in the office setting, more non-RBC colonoscopies (53 percent) than RBC colonoscopies (47 percent) were done. In the three settings combined, 8 percent of the claims in this 2001 sample had more than one colonoscopy within BETOS P8D coded on the same day (Table 6.3). The percentage with more than one colonoscopy code was similar across settings. [24]

Of the claims with one procedure, four CPT codes account for most of the colonoscopies: 45378, 45385, 45380, and 45384 (see Appendix for definitions). Among those records with two or more colonoscopy codes, the most common combinations are biopsy/removal of lesion by hot biopsy forceps or bipolar cautery (45380/45384), biopsy/removal of lesion by snare technique (45380/45385), and removal of lesion by hot biopsy forceps or bipolar cautery/ removal of lesion by snare technique (45384/45385).

Gastroenterologists performed a higher percentage of the colonoscopies in ASCs (72 percent) than in HOPDs (46 percent) or offices (67 percent) (Table 6.4). In HOPDs, most of the remaining colonoscopies were done by a general surgeon (12 percent) or an internist (8 percent). Internists performed most of the remaining colonoscopies in ASCs (6 percent) and offices (15 percent), with a smaller percentage of procedures being performed by a general surgeon in ASCs and offices (4 and 5 percent, respectively).

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[24] Modifier codes distinguish between multiple procedures that are performed on the same day or at the same session by the same provider (-51) and those that are distinct or independent from other procedures performed on the same day (-59). The percentage of claims that were coded with multiple procedures exceeded the percentage of claims that used either modifier –51 or –59, which suggests that the modifier codes may not be a reliable way to identify distinct procedures. For example, only 6 percent of the claims for professional services reported either multiple procedures (4 percent) or distinct procedures (2 percent). Modifiers were coded less frequently on the facility claims than the professional claims for procedures performed in OPDs and ASCs.

Table 6.3 Distribution of Colonoscopies (BETOSP8D) and Number of Procedures Coded for Same Day By Ambulatory Setting, Medicare Fee-for-Service, 2001

HCPCS	HCPCS Description	HOPD		ASC		Office		All Sites	
		N	%*	N	%*	N	%*	N	%*
All	Colonoscopy	63372	100	23503	100	4015	100	91190	100
	Non-RBC colonoscopy**	29035	45.8	10520	44.8	2133	53.1	41688	45.7
	RBC colonoscopy***	34337	54.2	12983	55.2	1882	46.9	49202	54
One procedure		58208	91.9	21338	90.8	3669	91.4	83215	91.6
44388	Colonoscopy through stoma; diagnostic, with or without collection of specimen(s) by brushing or washing (separate procedure).	221	0.3	35	0.1	7	0.2	263	0.3
44389	Colonoscopy through stoma; with biopsy, single or multiple.	58	0.1	7	0	0	0	65	0.1
44391	Colonoscopy through stoma; with control of bleeding, any method.	1	0	0	0	0	0	1	0
44392	Colonoscopy through stoma; with removal of tumor(s), polyp(s), or other lesion(s) by hot biopsy forceps or bipolar cautery.	49	0.1	7	0	1	0	57	0.1
44393	Colonoscopy through stoma; with ablation of tumor(s), polyp(s), or other lesion(s) not amenable to removal by hot biopsy forceps, bipolar cautery or snare technique.	12	0	0	0	0	0	12	0
44394	Colonoscopy through stoma; with removal of tumor(s), polyp(s), or other lesion(s) by snare technique.	53	0.1	4	0	0	0	57	0.1
45378	Colonoscopy, flexible, proximal to splenic flexure; diagnostic, with or without collection of specimen(s) by brushing or washing, with or without colon decompression (separate procedure).	26921	42.5	9160.0	39.0	1914.0	47.7	37995	41.8
45379	Colonoscopy, flexible, proximal to splenic flexure; with removal of foreign body.	15	0	6	0	4	0.1	25	0
45380	Colonoscopy, flexible, proximal to splenic flexure; with biopsy, single or multiple.	8472	13.4	3662	15.6	584	14.5	12718	14
45382	Colonoscopy, flexible, proximal to splenic flexure; with control of bleeding, any method.	120	0.2	56	0.2	10	0.2	186	0.2
45383	Colonoscopy, flexible, proximal to splenic flexure; with ablation of tumor(s), polyp(s), or other lesion(s) not amenable to removal by hot biopsy forceps, bipolar cautery or snare technique.	1629	2.6	368	1.6	54	1.3	2051	2.3
45384	Colonoscopy, flexible, proximal to splenic flexure; with removal of tumor(s), polyp(s), or other lesion(s) by hot biopsy forceps or bipolar cautery.	7023	11.1	2390	10.2	213	5.3	9626	10.6
45385	Colonoscopy, flexible, proximal to splenic flexure; with removal of tumor(s), polyp(s), or other lesion(s) by snare technique.	11996	18.9	4796	20.4	792	19.7	17584	19.3
45387	Colonoscopy, flexible, proximal to splenic flexure; with transendoscopic stent placement (includes predilation)	4	0	0	0	0	0	4	0
G0105	Colorectal screen; high risk individual	1634	2.6	847	3.6	90	2.2	2571	2.8
Two procedures		4866	7.7	1891	8.1	298	7.4	7055	7.8
Three procedures		271	0.4	178	0.8	39	1	488	0.5
Four procedures		19	0	71	0.3	4	0.1	94	0.1
Five procedures		6	0	25	0.1	5	0.1	36	0
Six procedures		2	0	0	0	0	0	2	0
Total		63372	100	23503	100	4015	100	90890	100

*Numbers in this column represent percentages of column total.

**Non-RBC colonoscopy includes HCPCS 44388, 45378, and G0105.

***RBC colonoscopy includes HCPCS 44389, 44391, 44392, 44393, 44394, 45379, 45380, 45382, 45383, 45384, 45385, and 45387.

Source: RAND analysis of the 5 percent Standard Analytic Files of Medicare claims, 2001.

Table 6.4 Top Five Specialties* of Providers Performing Colonoscopy (BETOS P8D) By Ambulatory Setting, Medicare Fee-for-Service System, 2001

Setting	Specialty Code	Specialty Description	Number	Percent**
HOPD	10	Gastroenterology	28,879	45.6
	2	General surgery	7,385	11.7
	11	Internal medicine	4,828	7.6
	70	Multispecialty clinic or group practice	2,382	3.8
	28	Colorectal surgery	2,121	3.3
ASC	10	Gastroenterology	16,879	71.8
	11	Internal medicine	1,507	6.4
	2	General surgery	984	4.2
	70	Multispecialty clinic or group practice	605	2.6
	28	Colorectal surgery	557	2.4
Office	10	Gastroenterology	2,693	67.1
	11	Internal medicine	608	15.1
	28	Colorectal surgery	199	5.0
	2	General surgery	197	4.9
	8	Family practice	156	3.9

*Specialties were derived from the claims for professional services associated with the procedure.

**Numbers in this column represent percentages of all procedures performed in the indicated setting. The percentages do not total 100 percent because they represent only the top five

Source: RAND analysis of the 5 percent Standard Analytic Files of Medicare claims, 2001.

Patient Characteristics

Looking at all colonoscopies combined, the average risk score for those performed in the HOPD (1.08) is higher than those in an office (1.04) or an ASC (1.00) (Table 6.5). In the three ambulatory settings combined, the average HCC risk scores are similar for the patients having non-RBC and RBC colonoscopies (1.05 and 1.06, respectively). This pattern of similar risk scores for RBC and non-RBC colonoscopies also holds true for the HOPD setting. However, for colonoscopies performed in the ASC and office, the average risk score is slightly higher for the RBC colonoscopies than the non-RBC.

In all three ambulatory sites, the two diagnoses coded most frequently on the facility claim are diverticulosis of colon (ICD-9-CM 562.10) and benign neoplasm of colon (ICD-9-CM 211.3)[25] (Table 6.6). Diverticulosis was coded much more frequently on HOPD claims (55 percent) than on ASC claims (33 percent) or office claims (35 percent). Other common gastrointestinal diagnoses are internal hemorrhoids, colonic polyps, and rectal and anal hemorrhage. One co-morbid diagnosis, hypertension (ICD-9-CM 401.9), was coded much more frequently on HOPD facility claims (16 percent) than on ASC or office claims (less than 1 percent of each).

The prevalence rates of 12 characteristics that might increase the risk of an adverse outcome (i.e., risk factors) among patients having a colonoscopy are shown in Table 6.7.[26] Each characteristic was identified using all claims for care received by the patient in any inpatient or outpatient setting during the months and days of 2001 preceding the date of the colonoscopy. The prevalence rates are higher among patients having the colonoscopy in an HOPD than in an ASC for all 12 risk factors. Although based on extremely small numbers, the prevalence rates of several risk factors are higher among the patients having colonoscopy in the office than in the HOPD.

[25] The diagnoses for the office setting are derived from the professional, rather than the facility, claim.

[26] As mentioned in the Methods section, the cataract surgery panel rated these characteristics with a median of 4 or higher on a 1-to-9 risk scale, with 9 being high risk.

Table 6.5 Average Risk Scores for Beneficiaries With Colonoscopies (BETOS P8D) By Ambulatory Setting, Medicare Fee-for-Service, 2001

HCPCS	Category	HOPD	ASC	Office	All Sites
All	Colonoscopy	1.08	1.00	1.04	1.06
	Non-RBC colonoscopy*	1.08	0.98	1.03	1.05
	RBC colonoscopy**	1.08	1.01	1.05	1.06

*Non-RBC colonoscopy includes HCPCS 44388, 45378, and G0105.
**RBC colonoscopy includes HCPCS 44389, 44391, 44392,
44393, 44394, 45379, 45380, 45382, 45383, 45384, 45385, and 45387.
Source: RAND analysis of the 5 percent Standard Analytic Files of Medicare claims, 2001.

Table 6.6 Top Ten Diagnoses on Facility Claim for Colonoscopy (BETOS P8D) By Ambulatory Setting, Medicare Fee-for-Service System, 2001

ICD-9 Code	ICD-9 Code Description	HOPD		ASC		Office		All Sites	
		N	%**	N	%**	N	%**	N	%**
562.1	Diverticulosis of colon	34,589	54.6	7,703	32.8	1,404	35.0	43,692	48.1
211.3	Benign neoplasm colon	24,696	39.0	9,738	41.4	1,564	39.0	35,995	39.6
455	Internal hemorrhoids without mention of complications	17,410	27.5	2,082	8.9	282	7.0	19,773	21.8
V12.72	Colonic polyps	8,080	12.8	2,394	10.2	296	7.4	10,769	11.8
401.9	Essential hypertension, unspecified	10,542	16.6	71	0.3	26	0.6	10,639	11.7
V16.0	Family HX-GI malignancy	5,114	8.1	915	3.9	163	4.1	6,192	6.8
569.3	Rectal & anal hemorrhage	3,350	5.3	1,095	4.7	439	10.9	4,883	5.4
V10.05	HX of colonic malignancy	4,015	6.3	715	3.0	94	2.3	4,824	5.3
578.1	Blood in stool	2,549	4.0	1,391	5.9	259	6.5	4,198	4.6
211.4	Benign neoplasm rectum and anal canal	3,343	5.3	672	2.9	135	3.4	4,150	4.6

*Diagnoses for physician office procedures was derived from professional claims.
**Numbers in this column represent percentages of all procedures performed in the indicated setting. The sum of the percentages might exceed 100 percent because multiple diagnoses can be coded on a single claim.
Source: RAND analysis of the 5 percent Standard Analytic Files of Medicare claims, 2001.

Table 6.7 Selected Risk Factors of Beneficiaries With Colonoscopy (BETOS P8D) By Ambulatory Setting, Medicare Fee-for Service System, 2001

Indicator*	Characteristic	HOPD		ASC		Office		All Sites	
		N	Rate**	N	Rate**	N	Rate**	N	Rate**
N	Cardiomyopathy/heart failure/pulmonary edema with hospitalization or emergency department visit within past one year	2,507	39.6	577	24.6	239	59.5	3,323	36.6
BF	Melena	1,560	24.6	276	11.7	230	57.3	2,066	22.7
U	Aortic stenosis	608	9.6	124	5.3	119	29.6	851	9.4
P	History of bleeding disorder	505	8	124	5.3	48	12	677	7.4
AG	Persistent severe sinus bradycardia or sick sinus tachycardia-bradycardia syndrome	374	5.9	76	3.2	56	13.9	506	5.6
X	Malignant hypertension	281	4.4	53	2.3	113	28.1	447	4.9
AC	Paroxysmal Ventricular Tachycardia	217	3.4	40	1.7	21	5.2	278	3.1
Y	Primary pulmonary hypertension	81	1.3	15	0.6	8	2	104	1.1
AD	Patient with Automatic Implanted Cardioverter Defibrillator (AICD)	83	1.3	12	0.5	2	0.5	97	1.1
F	Recent myocardial infarction (> 7 days but fewer than 30 days)	46	0.7	8	0.3	6	1.5	60	0.7
O	Orthopnea	29	0.5	4	0.2	6	1.5	39	0.4
E	Myocardial infarction within past 7 days	23	0.4	3	0.1	1	0.2	27	0.3

*Letter codes in this column are taken from the rating form for the RAND expert panel. (Refer to Appendix D)

**Per 1,000 procedures.

Source: RAND analysis of the 5 percent Standard Analytic Files of Medicare claims, 2001.

Outcomes

All adverse outcomes following colonoscopy occurred at a very low rate in all three ambulatory settings (Table 6.8) with only four with rates above 10 per 1000 (abdominal pain, chest pain, dyspnea, and hemorrhage). For 10 of 18 outcomes, the rates were highest in the office setting, including chest pain, which the panel agreed was preventable. For four outcomes, the rates were highest in the ASC and for another four, in the HOPD. The rate of perforation, which the panel rated as severe (but did not agree on preventability) was highest among ASC patients for all colonoscopies, as well as for the subcategories of RBC and non-RBC colonoscopies.

Table 6.8 Selected Outcomes Occurring Within 30 Days Following Colonoscopy (BETOS P8D) By Ambulatory Setting, Medicare Fee-for-Service System, 2001

Outcome	HOPD		ASC		Office		All Sites	
	N*	Rate**	N*	Rate**	N*	Rate**	N*	Rate**
Abdominal pain	2,694	42.5	720	30.6	264	65.8	3,678	40.5
Hemorrhage	1,306	20.6	419	17.8	148	36.9	1,873	20.6
Chest pain	1,076	17.0	163	6.9	107	26.7	1,346	14.8
Dyspnea	754	11.9	93	4.0	69	17.2	916	10.1
Small bowel obstruction	371	5.9	125	5.3	32	8.0	528	5.8
Arrhythmia	185	2.9	41	1.7	27	6.7	253	2.8
Vasovagal reactions	173	2.7	43	1.8	16	4.0	232	2.6
Sepsis and other infections	115	1.8	36	1.5	3	0.7	154	1.7
Abdominal distention	118	1.9	23	1.0	10	2.5	151	1.7
Other complications***	85	1.3	28	1.2	3	0.7	116	1.3
Hypotension	78	1.2	22	0.9	6	1.5	106	1.2
Perforation	41	0.6	30	1.3	2	0.5	73	0.8
Splenic rupture	30	0.5	4	0.2	1	0.2	35	0.4
Altered mental status	23	0.4	10	0.4	1	0.2	34	0.4
Endocarditis	6	0.1	3	0.1	1	0.2	10	0.1
Hypoxia	2	0.0	2	0.1	0	0.0	4	0.0
Hypertension	1	0.0	1	0.0	0	0.0	2	0.0
Death within 1 week	1	0.0	0	0.0	0	0.0	1	0.0

*Numbers in this column represent the number of outcomes.

**Per 1,000 procedures.

***Other compliations are diagnosis codes 998.89 (Other specified complications of procedures, not elsewhere classified), and 669.4 (Postoperative complication NOS).

Source: RAND analysis of the 5 percent Standard Analytic Files of Medicare claims, 2001.

SUMMARY OF FINDINGS

Compared to physician offices, a relatively higher proportion of colonoscopies performed in HOPDs and ASCs involve some lesion removal, biopsy, or control of bleeding. On the issue of patient characteristics, the panel did not reach agreement on the appropriateness physician offices as the site of care for patients with moderate risk. Of the patient characteristics that might increase risk, the prevalence rates are higher among patients having the colonoscopy in an HOPD than in an ASC. Although based on extremely small numbers, the prevalence rates of several risk factors are higher among the patients having colonoscopy in the office than in the HOPD. Looking at all colonoscopies combined, the average risk score for those performed in the HOPD (1.08) is higher than those in an office (1.04) or an ASC (1.00). All adverse outcomes following colonoscopy occurred at a very low rate in all three ambulatory settings with only four with rates above 10 per 1000 (abdominal pain, chest pain, shortness of breath, and hemorrhage).

7. SUMMARY OF FINDINGS AND DISCUSSION

The analyses described in this report were intended to identify measures that could be used to analyze how the nature of a procedure, the patient characteristics, and outcomes vary by the setting in which the procedure is provided and to investigate the feasibility of using administrative data to measure differences in procedures across ambulatory settings. While the study findings indicate that such analyses are feasible, a number of issues should be more fully developed before the results are used to draw conclusions regarding differences in quality of care or the appropriateness of site-of-service payment differentials across ambulatory settings.

In this section, we first summarize our findings for the selected study procedures and then discuss general issues that emerged from the expert panels and our empirical evaluation.

SUMMARY OF FINDINGS FOR STUDY PROCEDURES

MRI of the brain. On the issue of patient characteristics, the panel ratings and discussion indicated that MRIs are low risk procedures that can be safely performed in the different ambulatory settings. The two conditions that might pose risk- acute myocardial infarction (AMI) within the past seven days and automatic implantable cardioverter defibrillator (AICD) implants - were thought to occur very infrequently and this was confirmed by the empirical evidence. The expert panel discussed the issue of generalizability briefly and indicated that it is likely that similar results would be obtained from panels discussing other MRI and magnetic resonance angiography procedures, with and without contrast materials.

The empirical data indicated that patients receiving MRI with contrast have higher average HCC risk scores than patients receiving MRI without contrast, suggesting that they are more medically complex patients. However, after controlling for use of contrast media, the pattern of HCC risk scores across the sites is inconsistent. The data indicate that a higher proportion of MRIs with contrast are performed in HOPDs than in community settings. Both general medical outcomes and procedure-

specific outcomes occurred at a low rate in all three ambulatory settings following MRI, but differences across the sites are measurable. For all MRIs (with and without contrast), the rates for most outcomes were highest in the office setting. The HOPD rates were slightly lower than rates in the office and the rates for IDTFs were considerably lower.

Cataract Surgery. About 97 percent of procedures within this BETOS category were for a single HCPCS code. Detecting differences in the procedure across settings is problematic because of billing requirements for anesthesia time and materials and bundling of intraocular lenses into the facility payment. On the issue of patient characteristics, the panel ratings and discussion indicated that these are low risk procedures that can be safely performed in either an HOPD or ASC. Nevertheless, there are differences in the patient characteristics. The average HCC risk score is higher among patients having cataract surgery in an HOPD (1.21) than an ASC (1.14) and the prevalence rates are consistently higher for all 17 risk factors among patients having the cataract surgery in an HOPD than in an ASC. Adverse outcomes occurred at a low rate following cataract surgery. The analyses found few cataract procedures were performed in physician offices, but the findings for these procedures suggest that further investigation might be warranted. It is difficult to assess how likely these patterns would be to persist in other minor ophthalmologic and non-ophthalmologic surgical procedures.

Colonoscopy. Compared to physician offices, a higher proportion of procedures performed in HOPDs and ASCs involve some lesion removal, biopsy, or control of bleeding. On the issue of patient characteristics, the panel did not reach agreement on the appropriateness of physician offices as the site of care for several types of colonoscopies. Of the patient characteristics that might increase risk, the prevalence rates are higher among patients having the colonoscopy in an HOPD than in an ASC. Although based on extremely small numbers, the prevalence rates of several risk factors are higher among the patients having colonoscopy in the office than in the HOPD. Looking at all colonoscopies combined, the average HCC risk score for those performed in the HOPD (1.08) is higher than those in an office (1.04) or an ASC (1.00). All adverse outcomes following colonoscopy occurred at a very low rate in all three

ambulatory settings with only four with rates above 10 per 1000 (abdominal pain, chest pain, shortness of breath, and hemorrhage). The panel and RAND staff thought these risk patterns would likely be similar for other elective endoscopic procedures.

DISCUSSION

Expert Panels

The expert panels were a critical component of the study since the panel ratings targeted the measures that would be most appropriate for investigating variations in the study procedures across ambulatory settings. Several crosscutting themes emerged from the panel discussions and ratings that merit highlighting:

- The three study procedures were low-risk procedures that for most patients are appropriately performed across different ambulatory sites as long as the site has properly trained staff and appropriate equipment. The panelists identified only a few instances (e.g., MRI with anesthesia or high contrast media) where the panelists agreed it might be inappropriate to furnish the service in non-hospital settings. The colonoscopy panel was divided on the appropriateness of performing more complex procedures on higher risk patients in office settings.

- While Medicare has different health and safety standards for hospitals, ASCs, and IDTFs, it is not clear whether these have implications for how care is delivered across these settings. An off-campus hospital outpatient surgery center may be more like a freestanding ASC than the hospital-affiliated ASC that is co-located on the hospital's main campus. Differences in the typical care processes, physician specialties and equipment in an IDTF compared to a physician office are not well understood. State licensure laws and accreditation may be important factors in understanding the differences. For example, several panelists at the colonoscopy panel argued that some state licensure laws require that a physician office performing colonoscopies "look like an ASC" and should

not be rated based on a typical physician office. The division among the panel members over the appropriateness of furnishing particular colonoscopies in physician offices may be indicative of different perceptions of the structural characteristics of physician offices where colonoscopies are performed.

- Risk was rated higher for procedures that require general anesthesia and high dose contrast media. A MRI panelist noted that the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) had stringent monitoring requirements for the administration of contrast media that might have both cost and quality implications relative to non-JCAHO accredited facilities.

- We asked during the panel meetings whether there were particular patient subgroups that might require additional resources. Each panel provided specific examples but no ratings were solicited on the examples. For example, the MRI panel indicated a patient with claustrophobia was more time-consuming and may require sedatives. Only one or two examples were identified in each panel meeting and the three panels did not identify the same general health conditions.

- The generalizability of the findings to other procedures varied. Panelists felt that the risk patterns elucidated for MRI of the head, neck and brain would likely apply to other MRI and MRA procedures, even though they did not formally evaluate this. Similarly the patterns observed for colonoscopy would likely apply to other elective endoscopic procedures, though the underlying patients characteristics would probably have very different distributions. The cataract panelists, in contrast, found it difficult to ascertain how other minor ophthalmologic procedures would compare to their findings.

Empirical Evaluation

The second component of this task was to apply the set of clinically based measures to the claims data for a 5 percent sample of Medicare beneficiaries. Using claims data to examine potential differences in quality and processes of care across

ambulatory settings has several advantages. Medicare claims data are routinely collected and relatively inexpensive to analyze. They are available relatively quickly – there is a lag of seven months between the end of a calendar year and the release of Standard Analytic Files (SAF) of Medicare claims from CMS. Thus, measures based on claims data can be calculated in a timely fashion. The availability of claims data on an ongoing basis allows periodic evaluation crucial to identifying emerging trends and evaluating the impact of policy. However, outcomes can be difficult to measure using administrative data because clinical detail is lacking and data elements not directly related to payment might be unreliable.

Using administrative data to examine the study questions involved complex matching of provider and professional claims that had different formats, variables, and reporting requirements. The variables from claims data used in our analyses include dates of service, procedure codes and modifiers, and diagnostic codes. For an earlier task in this project that involved estimating Medicare volume and spending for specific procedures by site of service, Social and Scientific Systems, Inc. created analytic files that matched facility and professional service claims. This matching was done because the place of service coding on professional claims is often inaccurate. In the current task, considerable resources were expended to link the facility claim for a given index procedure with the associated claims for professional services. For the non-anesthesia professional claims, we were interested in determining whether there were differences in the diagnostic and procedure coding on the facility claim and the modifier descriptions of the professional services. We found that these professional claims provided little additional information relative to what is provided without the matching process and that the matching may be unnecessary to examine most issues related to patient characteristics and quality of care within a BETOS category. It becomes more important, however, if particular procedures are at issue, since as discussed below, we found differences in the procedure coding on the facility and professional claims.

Analysis of the anesthesia services presented a unique set of challenges. First, the match rate to facility claims is lower because unique HCPCS and BETOS codes for anesthesia preclude matching on these variables in addition to date of service. Second, actual time units, which potentially could be used to measure differences in the length of

procedures, are not available on the SAF; instead, time intervals (MTUS) are reported. The MTUS are either in 15-minute or 30-minute intervals, depending on whether the anesthesia is personally administered or medical direction of a CRNA is involved, whether there are concurrent procedures, and if monitored anesthesia care is provided. Teasing useful information from the MTUS would not be a trivial task, particularly since the reasons why procedures are longer in one setting or another would still need to be determined. For example, longer procedure times could be indicative of differences in patient characteristics or could indicate differences in productivity.

Although the rate of missing information on date of service is low because it is required for payment of a claim, the date of service on the claim might be different from the date the procedure was actually performed. In addition, the claim from and through dates and the line item date of service might be different, necessitating a decision regarding which date is more accurate. When matching facility and professional claims for the same procedure, we needed to employ an algorithm for the dates of services to allow for a difference of one or more days. Otherwise, procedures might be double-counted due to unmatched records for the same procedure. These situations emphasize that caution must be exercised in identifying and interpreting dates of services on claims.

Two general issues of concern regarding procedure codes are (1) the use of multiple codes for the same or related procedures with the same date on the same claim, and (2) differences in procedure codes between the facility and professional claims. Related to the first issue, as reported earlier in the results sections, we found that many claims have from two to five HCPCS procedure codes within the same BETOS category coded with the same date. In fact, the multiple HCPCS codes were identical on many of the records having multiple procedures in the same BETOS. Without further examination, it is difficult to know for certain whether this represents different components of the same procedure, a coding error, or repeat procedures. Since the multiple procedures occur most often for services furnished in the physician office setting, it is likely most are different components of the same service. For example, multiple procedure code line items may have been billed with the appropriate modifiers on the same date of service when a physician other than the surgeon

performing the cataract procedure furnished pre- and/or post-operative care. Related to the second issue, in the process of matching the facility and professional claims, we were able to match a much higher proportion of records using the beneficiary ID, date of service, and the BETOS code rather than using beneficiary ID, date of service, and the HCPCS code. This indicates that the HCPCS procedure code on the facility claim frequently differs from the HCPCS code on the professional claim and could complicate procedure-specific analyses.

There are also concerns about using claims data for condition-specific analyses because identifying clinical subgroups of patients with ICD-9-CM codes might be problematic. These concerns fall into two categories: 1) the ICD-9-CM diagnostic nomenclature, and 2) the use of ICD-9-CM diagnostic codes (Iezzoni, 1990). The ICD-9-CM nomenclature contains many ambiguities. Codes may be vague (e.g., heart failure, unspecified) and contain symptomatic as well as etiologic codes (e.g., fatigue). In addition, the nomenclature provides only limited indicators of the severity of a condition. This makes identifying specific clinical outcomes following a procedure problematic. For example, the colonoscopy panel noted that some complications can range from minor to severe. Concerned with the potential under-reporting of complications, the panel rated complications with the understanding that only those that are severe are likely to be found in the administrative data.

The way hospitals and providers use the codes might also exacerbate some of the problems inherent in the nomenclature. For example, while inpatient claims data usually contain multiple diagnoses for each admission, most outpatient claims contain at most a few diagnostic codes. Also, generating hospital payment based on the Medicare DRG system, which is based on the ICD-9-CM codes, has introduced a potential pecuniary bias into coding practices known as "DRG creep" (Simborg, 1981). Studies to validate ICD-9-CM with chart-based reviews have uncovered substantial inaccuracies and unexplained geographic variation (IOM, 1980). The degree of inaccuracy, however, depends greatly on the condition and algorithm used to detect the condition (Quam et al., 1993).

Attributing outcomes to particular procedures is often problematic. In particular, both the cataract and MRI panels expressed concern that conditions following the

procedure may be more indicative of ineffective or poor pre-or post-operative care than being complications related to the actual procedure. The cataract panel suggested limiting the more general health outcomes to those occurring within 7 days compared to a 30-day window for eye-specific complications. Using bleeding as an example, the colonoscopy panel also cautioned that it might be difficult to distinguish a potential complication of the colonoscopy from the symptoms that created the need for the procedure.

In these preliminary analyses, we controlled for major procedure differences that might affect outcomes by separately examining complication rates for MRI with and without contrast media and colonoscopy with and without “RBC.” (Cataract surgeries were dominated by one procedure code and therefore were not categorized by procedure characteristics). However, we did not control for differences in patient characteristics across settings that might affect outcomes. In this regard, the cataract panel suggested it would be important to look at rates for cystoid macular edema separately for diabetic and non-diabetic patients since diabetes make the condition less preventable. For congestive heart failure, the panelists suggested that the analysis should look for signs of new or worsening congestive heart failure. These are the types of refinements that would need to be made before any conclusions could be made concerning differences in quality of care across ambulatory settings.

One study question was whether there are differences in the nature of the procedure in different settings. Other than differences that are accounted for by the HCPCS codes and modifiers, we found our ability to address this issue through the administrative data was limited. As noted above, we were not able to use the anesthesia claims to assess whether there are differences in the length of surgical procedures and, because of match rates, results concerning type of anesthesia are problematic. For those claims that we were able to match, we generated some interesting information regarding how professional anesthesia services are furnished in ASCs and HOPDs; however, the study focus is on facility, not professional services. Multiple MRI sequences also increase costs but are also not fully captured in comparative data.

Opportunity to examine product differences was also affected by the different payment rules for ambulatory services. For example, we were unable to compare anesthetics across the settings because the anesthetic is bundled into the facility payment to both ASCs and HOPDs. Some information is available in the claims regarding high dose contrast media provided in physician offices and IDTFs; however, payment is bundled into the APC payment and the type of contrast media may not be reliably reported on HOPD claims data.[27] One distinction between HOPDs and the other ambulatory settings is that resident training, which may increase procedure time, takes place almost exclusively in HOPD settings.

A related study question was whether administrative data could be used to determine if there are differences in the patient characteristics across the three settings that might affect the resources required to perform the procedure. Enrollment data provide information is available on patient demographics (age, sex, race) and factors that might affect the medical complexity of a patient (Medicaid status, entitlement based on disability or end-stage renal disease). The claims history also provides a mechanism to identify patients with particular conditions requiring medical care subject to the limitations discussed above regarding the use of ICD-9-CM codes. The claims history can also be used to assign patients to HCC risk categories that can be used to summarize the patient's medical complexity based on predicted needs. The underlying assumption is that performing a diagnostic or surgical procedure on a medically complex patient or patient with a particular condition such as dementia may require more resources; however, this is an empirical question that cannot be answered directly with administrative data. Since our literature review did not find information on this issue, we asked during the panel meetings whether there were particular patient subgroups that might require additional resources. Each panel provided specific examples but no ratings were solicited on the examples. For example, the MRI panel indicated a patient with claustrophobia was more time-consuming and may require

[27] It is likely that most procedures involving high dose contrast media are reported under CPT codes 70543, 70546, 70549, and 70553 (which report MRIs and MRAs of the head, neck or brain involving without contrast material, followed by with contrast material(s) and further sequences). However, it cannot be assumed that these codes are used exclusively for high dose contrast media nor that high dose contrast media is used only after no contrast materials and lower dose materials are used.

sedatives. Patients with dementia and those with monocular vision were identified by the colonoscopy and cataract panels, respectively, as requiring more time. In retrospect, it is not clear whether the additional time for monocular patients related to facility services or professional services, or both.

The overall limitations of claims data and of specific variables used in our analysis do not mean that claims data should not be used for clinically-based measures, though confirmation with more clinically detailed methods such as chart review would be desirable. The expert panel ratings and our preliminary analyses for the three procedures suggest that with further refinement the administrative data can be used to reach a number of policy-relevant conclusions that have implications not only for the study procedures but also for other procedures with similar risk.

APPENDIX A. HCPCS (CPT) CODES FOR THREE STUDY PROCEDURES

BETOS I2C: ADVANCED IMAGING—MRI: HEAD, NECK, AND BRAIN

CPT Code	CPT Description
70541	Magnetic resonance angiography, head and/or neck, with or without contrast material(s).
70542	MR (e.g., proton) imaging, orbit, face, and neck; with contrast material
70543	MR (e.g., proton) imaging, orbit, face, and neck; without contrast material, followed by contrast material(s) and further sequences.
70544	MR angiography, head; without contrast material(s)
70545	MR angiography, head; with contrast material(s)
70546	MR angiography, head; without contrast material, followed by contrast material(s) and further sequences.
70547	MR angiography, neck; without contrast material(s)
70548	MR angiography, neck; with contrast material(s)
70549	MR angiography, neck; without contrast material, followed by contrast material(s) and further sequences.
70551	Magnetic resonance (e.g., proton) imaging, brain (including brain stem); without contrast material
70552	Magnetic resonance (e.g., proton) imaging, brain (including brain stem); with contrast material(s).
70553	Magnetic resonance (e.g., proton) imaging, brain (including brain stem); without contrast material, followed by contrast material(s) and further sequences.

BETOS P4B: EYE PROCEDURE—CATARACT REMOVAL/LENS INSERTION

CPT Code	CPT Description
66820*	Discission of secondary membranous cataract (opacified posterior lens capsule and/or anterior hyaloid); stab incision technique (Ziegler or Wheeler knife).
66830	Removal of secondary membranous cataract (opacified posterior lens capsule and/or anterior hyaloid) with corneo-scleral section, with or without iridectomy (iridocapsulotomy, iridocapsulectomy).
66840	Removal of lens material; aspiration technique, one or more stages.
66850	Removal of lens material; phacofragmentation technique (mechanical or ultrasonic) (e.g., phacoemulsification), with aspiration.
66852	Removal of lens material; pars plana approach, with or without vitrectomy.
66920	Removal of lens material; intracapsular.
66930	Removal of lens material; intracapsular, for dislocated lens.
66940	Removal of lens material; extracapsular (other than 66840, 66850, 66852).
66982	Extracapsular cataract removal with insertion of intraocular lens prosthesis (one stage procedure), manual or mechanical technique, (eg, irrigation and aspiration or phacoemulsification), complex, requiring devices or techniques not generally used in routine cataract surgery (eg, iris expansion device, suture support for intraocular lens, or primary posterior capsulorrhexis) or performed on patients in the amblyogenic developmental stage
66983	Intracapsular cataract extraction with insertion of intraocular lens prosthesis (one stage procedure).
66984	Extracapsular cataract removal with insertion of intraocular lens prosthesis (one stage procedure), manual or mechanical technique (eg, irrigation and aspiration or phacoemulsification).
66985	Insertion of intraocular lens prosthesis (secondary implant), not associated with concurrent cataract removal.
66986	Exchange of intraocular lens.

*The CPT code 66820 is in BETOS category P4E (Eye procedure - other).

BETOS P8D: ENDOSCOPY—COLONOSCOPY

CPT Code	CPT Description
44388	Colonoscopy through stoma; diagnostic, with or without collection of specimen(s) by brushing or washing (separate procedure).
44389	Colonoscopy through stoma; with biopsy, single or multiple.
44390	Colonoscopy for foreign body
44391	Colonoscopy through stoma; with control of bleeding, any method.
44392	Colonoscopy through stoma; with removal of tumor(s), polyp(s), or other lesion(s) by hot biopsy forceps or bipolar cautery.
44393	Colonoscopy through stoma; with ablation of tumor(s), polyp(s), or other lesion(s) not amenable to removal by hot biopsy forceps, bipolar cautery or snare technique.
44394	Colonoscopy through stoma; with removal of tumor(s), polyp(s), or other lesion(s) by snare technique.
44397	Colonoscopy w/stent
45355	Surgical colonoscopy
45378	Colonoscopy, flexible, proximal to splenic flexure; diagnostic, with or without collection of specimen(s) by brushing or washing, with or without colon decompression (separate procedure).
45379	Colonoscopy, flexible, proximal to splenic flexure; with removal of foreign body.
45380	Colonoscopy, flexible, proximal to splenic flexure; with biopsy, single or multiple.
45382	Colonoscopy, flexible, proximal to splenic flexure; with control of bleeding, any method.
45383	Colonoscopy, flexible, proximal to splenic flexure; with ablation of tumor(s), polyp(s), or other lesion(s) not amenable to removal by hot biopsy forceps, bipolar cautery or snare technique.
45384	Colonoscopy, flexible, proximal to splenic flexure; with removal of tumor(s), polyp(s), or other lesion(s) by hot biopsy forceps or bipolar cautery.
45385	Colonoscopy, flexible, proximal to splenic flexure; with removal of tumor(s), polyp(s), or other lesion(s) by snare technique.
45387	Colonoscopy, flexible, proximal to splenic flexure; with transendoscopic stent placement (includes predilation)
G0105*	Colorectal screen; high risk individual

*Level II HCPCS code.

APPENDIX B. EXPERT PANEL FOR MRI OF BRAIN, HEAD AND NECK

February 12, 2004

Dr. Yoshimi Anzai, MD
Associate Professor, Department of Radiology
University of Washington Medical Center
1959 N.E. Pacific Street, Box 357115
Seattle, WA 98195-7115

Dr. Michael Brant-Zawadzki
Hoag Memorial Hosp.
Radiology Dept., One Hoag Dr., Box 6100
Newport Beach, CA 92658-6100

Dr. Carl Ellenberger, Jr, MD
GSH Imaging Center
Box 70
320 Oak Street
Lebanon, PA 17042

Dr. Geoffrey Hartwig
415 South 28th Avenue
Hattiesburg, MS 39402

Dr. Vincent P. Mathews
Northwest Radiology Network
5756 W. 71st St.
Indianapolis, IN 46278

Dr. Robert A. Murray, MD
Rockford Memorial Hosp.
Radiology Dept., 2400 N. Rockton Ave.
Rockford, IL 61103
[completed task 1 and 2, but not panel discussion]

Dr. C. Douglas Phillips
Univ. Virginia Health Syst.
Dept. of Radiology, Box 800170, Lee St.
Charlottesville, VA 22908

Dr. Victoria Rand
San Francisco, CA 94131

Dr. Gerald Smetana, MD
Division of General Medicine and Primary Care
Beth Israel Deaconess Medical Center
Boston
Shapiro-621
330 Brookline Avenue
Boston, MA 02215
[participated in both cataract and MRI panels]

Facilitator: Dr. Steven Asch, RAND

MRI RATING FORMS AND EXPERT PANEL PROCESS

A. Outcomes/complications, round “0” (first-round): preventability and severity. Panelist provided ratings prior to the panel discussion and faxed their responses. The panelists’ responses were entered into a database.

B. Outcomes/complications, round “1” (second-round) with rating summary: preventability and severity. Some panelists suggested additional outcomes that should be included. Others suggested that some of the terms should be altered slightly. Panelists received this rating form, which incorporates suggestions from “round 0,” and a summary of the scores for each indicator. Panelists completed the rating form again during the panel discussion.

C. Patient characteristics: risk. Panelists provided tentative ratings prior to the panel discussion and made final ratings during the teleconference.

D. Procedure characteristics: appropriateness across outpatient settings. Panelists provided tentative ratings prior to the panel discussion and made final ratings during the teleconference

SUMMARY OF MRI EXPERT PANEL RATINGS FOR PATIENT CHARACTERISTICS

		HOSPITAL OUTPATIENT DEPT							IDTF							PHYSICIAN OFFICE						
	Patient Characteristics	# Resp	Median	Mean Dev	Agree?	<4	4-6	>6	# Resp	Median	Mean Dev	Agree ?	<4	4-6	>6	# Resp	Median	Mean Dev	Agree ?	<4	4-6	>6
A	Age > 70 years	8	1	0.38	Y	8	0	0	8	1	0.50	Y	8	0	0	8	1	0.50	Y	8	0	0
B	Age > 85 years	8	2	0.63	Y	7	1	0	8	2	0.63	Y	8	0	0	8	2	0.75	Y	7	1	0
C	Stable angina	7	1	0.43	Y	7	0	0	7	1	0.71	Y	6	1	0	7	1	0.86	Y	6	1	0
D	Unstable angina in last 3 months	7	3	1.00	Y	6	1	0	7	4	1.29	I	3	3	1	7	4	1.43	I	3	3	1
E	Myocardial infarction within past 7 days	8	4	1.63	N	3	2	3	8	4.5	1.88	N	2	3	3	8	4.5	2.00	N	2	3	3
F	Recent myocardial infarction (> 7 days but fewer than 30 days)	8	2.5	1.44	Y	6	2	0	8	3.5	1.88	I	4	3	1	8	3.5	2.00	I	4	3	1
G	Myocardial infarction (>30 days but fewer than 6 months)	8	2	1.25		6	2	0	8	2.5	1.50	I	6	1	1	8	3	1.38	I	6	1	1
H	Old myocardial infarction (> 6 months)	8	1	0.63	Y	7	1	0	8	1	0.88	Y	6	2	0	8	1	0.88	Y	6	2	0
I	Chronic obstructive pulmonary disease with hospitalization or emergency department visit within past one year	8	2	0.50	Y	8	0	0	8	2	0.88	Y	6	2	0	8	2	1.00	Y	6	2	0
J	Asthma with hospitalization or emergency department visit within past one year	8	2	0.50	Y	8	0	0	8	2	0.88	Y	6	2	0	8	2	1.00	Y	6	2	0
K	Cardiomyopathy/heart failure/pulmonary edema with hospitalization or emergency department visit within past one year	8	2.5	0.81	Y	7	1	0	8	3	1.50	Y	4	4	0	8	3	1.63	Y	4	4	0
L	Orthopnea	8	2.5	0.81	Y	7	1	0	8	3	1.13	Y	5	3	0	8	3.5	1.25	Y	4	4	0

		HOSPITAL OUTPATIENT DEPT							IDTF							PHYSICIAN OFFICE			
	Patient Characteristics	# Resp	Median	Mean Dev	Agree?	<4	4-6	>6	# Resp	Median	Mean Dev	Agree ?	<4	4-6	>6	# Resp	Median	Mean Dev	Agree ?
M	Diabetes mellitus (Type 2), requiring insulin	8	1	0.38	Y	8	0	0	8	1.5	0.63	Y	8	0	0	8	1.5	0.63	Y
N	Chronic renal failure, requiring hemodialysis	8	2	0.25	Y	8	0	0	8	2	0.25	Y	8	0	0	8	2	0.38	Y
O	Chronic renal failure, not requiring hemodialysis	8	2	0.38	Y	8	0	0	8	2	0.63	Y	8	0	0	8	2	0.63	Y
P	Mobitz Type 2 Atrioventricular block	8	1.5	1.69	N	6	0	2	8	1.5	2.25	N	6	0	2	8	1.5	2.38	N
Q	Anomalous atrioventricular excitation including:accelerated, accessory, ventricular pre-excitation, Wolff-Parkinson-White syndrome	8	1.5	1.69	N	6	0	2	8	1.5	2.25	N	6	0	2	8	1.5	2.38	N
R	Paroxysmal Supraventricular Tachycardia	8	1	1.13	Y	6	2	0	8	1	1.75	N	6	0	2	8	1	1.75	N
S	Paroxysmal Ventricular Tachycardia	8	2	1.75	I	5	2	1	8	2.5	2.38	N	5	1	2	8	2.5	2.38	N
T	Patient with Automatic Implanted Cardioverter Defibrillator (AICD)	8	9	0.88	I	1	0	7	8	9	0.50	Y	0	1	6	8	9	0.50	Y
U	Atrial fibrillation	8	1	0.75	Y	6	2	0	8	1	1.25	Y	6	2	0	8	1	1.38	Y
V	Atrial flutter in past 6	8	1	0.50	Y	8	0	0	8	1	1.00	Y	6	2	0	8	1	1.13	Y
W	Persistent severe sinus bradycardia or sick sinus tachycardia-bradycardia syndrome	8	1	0.75	Y	7	1	0	8	1.5	1.38	I	6	1	1	8	1.5	1.50	I
X	Seizure disorder	8	1	0.50	Y	8	0	0	8	1	1.00	Y	6	2	0	8	1	1.00	Y
Y	Dementia	8	1	0.25	Y	8	0	0	8	1	0.38	Y	8	0	0	8	1	0.38	Y
Z	Stroke within past 6 months	8	1	0.25	Y	8	0	0	8	1	0.38	Y	8	0	0	8	1	0.38	Y

		HOSPITAL OUTPATIENT DEPT							IDTF							PHYSICIAN OFFICE						
	Patient Characteristics	# Resp	Median	Mean Dev	Agree?	<4	4-6	>6	# Resp	Median	Mean Dev	Agree ?	<4	4-6	>6	# Resp	Median	Mean Dev	Agree ?	<4	4-6	>6
AA	Barbiturate, chlordiazepoxide, diazepam, glutethimide, meprobamate, or methaqualone	8	2	0.75	Y	7	1	0	8	2	1.38	I	7	0	1	8	2	1.38	I	7	0	1
AB	Opioid type dependence	8	1.5	0.81	Y	7	1	0	8	1.5	1.25	I	7	0	1	8	1.5	1.25	I	7	0	1
AC	Alcohol abuse	8	1.5	0.44	Y	8	0	0	8	1.5	0.63	Y	8	0	0	8	1.5	0.63	Y	8	0	0
AD	Anxiety	8	1	0.50	Y	8	0	0	8	1.5	1.25	I	7	0	1	8	1.5	1.38	I	6	1	1
AE	Schizophrenic disorder	8	1	0.25	Y	8	0	0	8	1	0.50	Y	8	0	0	8	1	0.50	Y	8	0	0
AF	History of Claustrophob ia	8	1	0.50	Y	8	0	0	8	1	1.00	I	7	0	1	8	1	1.00	I	7	0	1
AG	Personal history of allergy to anesthetic agent	8	1.5	0.56	Y	8	0	0	8	2	1.50	I	6	1	1	8	2	1.63	I	5	2	1
AH	History of shock due to anesthesia in which correct substance was properly administered	8	1.5	0.69	Y	7	1	0	8	2	1.38	I	6	1	1	8	2	1.50	I	5	2	1
AI	Essential, Benign, or Drug-Related Tremor	8	1	0.13	Y	8	0	0	8	1	0.63	Y	7	1	0	8	1	0.63	Y	7	1	0
AJ	Abnormal head movements, Fasciculations, Spasms, or Tremor Not Otherwise Specified	8	1	0.38	Y	8	0	0	8	1	1.25	I	6	1	1	8	1	1.25	I	6	1	1
AL	Personal allergy to radiographic dye	8	1	0.38	Y	8	0	0	8	1.5	0.50	Y	8	0	0	8	1.5	0.50	Y	8	0	0
AM	History of anaphylactic shock not otherwise specified or due to adverse effect of correct medicinal substance properly administered, excluding anaphylactic reaction to serum or adverse	8	1.5	1.19	Y	6	2	0	8	2.5	1.88	I	5	2	1	8	2.5	2.00	I	5	2	1

	Patient Characteristics	HOSPITAL OUTPATIENT DEPT # Resp	Median	Mean Dev	Agree?	<4	4-6	>6	IDTF # Resp	Median	Mean Dev	Agree ?	<4	4-6	>6	PHYSICIAN OFFICE # Resp	Median	Mean Dev	Agree ?	<4	4-6	>6
AN	Cerebral edema	8	2.5	0.81	Y	7	1	0	8	4	1.75	I	4	3	1	8	4.5	1.63	I	3	4	1
AO	Malignant neoplasm of the brain	8	1.5	0.56	Y	8	0	0	8	2	1.13	I	7	0	1	8	2.5	1.25	I	7	0	1
AP	Malignant neoplasm of the eye, excluding carcinoma in situ, eyelid (skin), cartilage, optic nerve, or orbital bone	8	1	0.13	Y	8	0	0	8	1	0.63	Y	7	1	0	8	1	0.75	I	7	0	1
AQ	Retained (old) MAGNETIC intraocular foreign body,	8	6	2.00	N	2	2	4	8	6	2.38	N	2	2	4	8	6	2.38	N	2	2	4
AR	Retained (old) retrobulbar foreign body	8	4.5	1.56	N	3	3	2	8	4.5	2.00	N	2	4	2	8	4.5	2.00	N	2	4	2
AS	Penetration of eyeball with MAGNETIC foreign body (open wound of eyeball), (not old)	8	6	2.13	N	2	2	4	8	6	2.38	N	2	2	4	8	6	2.38	N	2	2	4
AT	Penetrating wound of orbit with foreign body (open wound of ocular adnexa)	8	4.5	1.94	N	3	2	3	8	4.5	2.50	N	3	2	3	8	4.5	2.50	N	3	2	3

SUMMARY OF MRI EXPERT PANEL RATINGS FOR PROCEDURE CHARACTERISTICS

Procedure	NORMAL OR VERY LOW RISK							LOW-MODERATE RISK							MODERATE RISK						
HOSPITAL OUTPATIENT DEPARTMENT																					
	# Resp	Median	Mean Dev	Agree ?	<4	4-6	>6	# Resp	Median	Mean Dev	Agree ?	<4	4-6	>6	# Resp	Median	Mean Dev	Agree ?	<4	4-6	>6
A MRI head without dye	8	9	0.00	Y	0		8	6	9	0.00	Y	0		8	8	9	0.88	Y	0		7
B MRI head with dye	8	9	0.13	Y	0		8	6	9	0.00	Y	0		8	8	8.5	1.00	Y	0		7
C MRI with anesthesia	8	9	0.50	Y	0		8	6	8.5	1.50	Y	0		6	8	7	2.13	N	2		5
D High dose contrast MRI	8	2	2.13	N	6		2	6	2	2.17	I	6		1	8	1	1.63	I	6		1
HOSPITAL EMERGENCY ROOM																					
	# Resp	Median	Mean Dev	Agree ?	<4	4-6	>6	# Resp	Median	Mean Dev	Agree ?	<4	4-6	>6	# Resp	Median	Mean Dev	Agree ?	<4	4-6	>6
A MRI head without dye	8	9	0.00	Y	0		7	7	9	0.00	Y	0		7	7	9	1.00	Y	0		6
B MRI head with dye	8	9	0.14	Y	0		7	7	9	0.00	Y	0		7	7	8	1.00	Y	0		6
C MRI with anesthesia	8	9	1.00	Y	0		6	7	7	1.14	Y	0		5	7	7	1.86	I	1		4
D High dose contrast MRI	8	2	2.29	N	5		2	7	2	1.71	I	5		1	7	1	1.86	I	5		1
INDEPENDENT TREATMENT FACILITY																					
	# Resp	Median	Mean Dev	Agree ?	<4	4-6	>6	# Resp	Median	Mean Dev	Agree ?	<4	4-6	>6	# Resp	Median	Mean Dev	Agree ?	<4	4-6	>6
A MRI head without dye	7	9	0.00	Y	0		7	7	9	0.14	Y	0		7	7	8	1.71	I	1		5
B MRI head with dye	7	9	0.14	Y	0		7	7	9	0.29	Y	0		7	7	7	1.86	I	1		4
C MRI with anesthesia	7	3	2.71	N	4		3	7	2	2.14	I	4		1	7	1	1.29	Y	5		0
D High dose contrast MRI	7	2	2.43	N	5		2	7	1	1.86	I	5		1	7	1	1.71	I	5		1
PHYSICIAN OFFICE																					
	# Resp	Median	Mean Dev	Agree ?	<4	4-6	>6	# Resp	Median	Mean Dev	Agree ?	<4	4-6	>6	# Resp	Median	Mean Dev	Agree ?	<4	4-6	>6
A MRI head without dye	7	9	0.00	Y	0		7	7	9	0.14	Y	0		7	7	7	1.71	I	1		5
B MRI head with dye	7	9	0.14	Y	0		7	7	9	0.43	Y	0		7	7	6	1.71	I	1		3
C MRI with anesthesia	7	3	2.29	N	4		2	7	1	2.00	N	5		2	7	1	1.14	Y	5		0
D High dose contrast MRI	7	2	2.43	N	5		2	7	1	1.86	I	5		1	7	1	1.29	I	6		1

SUMMARY FOR MRI EXPERT PANEL RATINGS FOR PATIENT OUTCOMES

		PREVENTABLE							SEVERITY						
	Outcomes	# Resp	Median	Mean Dev	Agree ?	<4	4-6	>6	# Resp	Median	Mean Dev	Agree ?	<4	4-6	>6
A	Altered mental status	7	2	0.71	Y	7	0	0	7	2	1.00	Y	6	1	0
B	Anaphylaxis/anaphylactoid reaction	7	2	1.29	Y	5	2	0	7	8	0.43	Y	0	0	7
C	Bradycardia	7	1	0.57	Y	7	0	0	7	2	0.71	Y	7	0	0
D	Chest pain	7	1	0.29	Y	7	0	0	7	3	1.57	Y	4	2	1
E	Death	6	5.5	2.00	I	2	3	1	6	9	0.00	Y	0	0	6
F	Dizziness	5	1	0.80	Y	5	0	0	6	2	0.50	Y	6	0	0
G	Dyspnea	6	3	0.67	Y	5	1	0	6	4.5	1.50	I	2	3	1
H	Headache	6	1	0.17	Y	6	0	0	4	2	0.00	Y	4	0	0
I	Hypertension	6	2	0.67	Y	6	0	0	6	3	1.00	Y	4	2	0
J	Hypotension	6	2	1.00	Y	5	1	0	6	4.5	1.50	Y	2	4	0
K	Ocular injury	6	8	0.67	Y	0	0	6	6	8	1.17	I	1	0	5
L	Paresthesia	7	1	0.71	Y	7	0	0	7	1	0.57	Y	7	0	0
M	Rash	7	3	1.14	Y	5	2	0	7	2	0.71	Y	7	0	0
N	Seizure	6	1	0.17	Y	6	0	0	7	5	1.71	I	1	3	3
O	Syncope	7	1	1.14	Y	5	2	0	7	2	1.86	I	4	2	1
P	Tachycardia	7	2	1.14	Y	6	1	0	7	3	1.29	Y	4	3	0
Q	Vasodilatation	7	1	0.57	Y	6	1	0	7	3	1.00	Y	6	1	0
R	Vasospasm	7	1	0.86	Y	6	1	0	7	3	1.00	Y	5	2	0

APPENDIX C. EXPERT PANEL ON CATARACT SURGERY

February 4, 2004

Dr. Marc Allan Feldman
The Cleveland Clinic
9500 Euclid Avenue
Mail Code: E31
Cleveland, OH 44195
(216) 444-9088

Dr. Steve Gayer
10424 SW 17 Manor
Davie, FL 33324
[completed task 1 and 2, but not panel discussion]

Dr. Greg Kwasny, MD
Eye Surgery Associates, S.C.
2300 N. Mayfair Rd. #1030
Milwaukee, WI 53226

Dr. Samuel Masket
Advanced Vision Care
2080 Century Park East, #911
Los Angeles, Ca 90067

Dr. Stephen Obstbaum
115 E. 39th Street
New York, NY 10016

Dr. Priscilla Perry Arnold
Springfield, MO 65809

Dr. Stephen Ross
1304 15th Street, Suite 400
Santa Monica, CA 90404

Dr. Harry Zink, MD
3519 Friendsville Road
Wooster, OH 44691

Facilitator: Dr. Steven Asch, RAND

Dr. Gerald Smetana, MD
Division of General Medicine and Primary Care
Beth Israel Deaconess Medical Center
Boston
Shapiro-621
330 Brookline Avenue
Boston, MA 02215
[participated in both cataract and MRI panels]

CATARACT RATING FORMS AND EXPERT PANEL PROCESS

A. Outcomes/complications, round “0” (first-round): preventability and severity. Panelist provided ratings prior to the panel discussion and faxed their responses. The panelists’ responses were entered into a database.

B. Outcomes/complications, round “1” (second-round) with rating summary: preventability and severity. Some panelists suggested additional outcomes that should be included. Others suggested that some of the terms should be altered slightly. Panelists received this rating form, which incorporates suggestions from “round 0,” and a summary of the scores for each indicator. Panelists completed the rating form again during the panel discussion.

C. Patient characteristics: risk. Panelists completed this rating form during the panel discussion.

D. Procedure characteristics: appropriateness across outpatient settings. Panelists briefly discussed procedure characteristics and completed the rating form after the panel discussion.

E. Follow-up email sent to cataract panelists reminding panelists to return comments about cataract surgery. Because there was insufficient time to discuss all of the procedure characteristics, the panelists were asked to review the procedure characteristics and email comments about the procedure characteristics to the project team.

F. Follow-up email sent to cataract panelists summarizing comments received about procedure characteristic. A summary of the panelists’ comments about procedure characteristics was emailed to all of the panelists.

SUMMARY OF CATARACT EXPERT PANEL RATINGS FOR PATIENT CHARACTERISTICS

		HOSPITAL OUTPATIENT DEPT							AMBULATORY SURGERY CENTER						
	Patient Characteristics	#Resp	Median	Mean Dev	Agree?	<4	4-6	>6	#Resp	Median	Mean Dev	Agree?	<4	4-6	>6
A	Age > 70 years	7	2	0.43	Y	7	0	0	6	1.5	0.50	Y	6	0	0
B	Age > 85 years	7	2	0.43	Y	7	0	0	6	2	0.50	Y	6	0	0
C	Stable angina	7	3	0.57	Y	5	2	0	6	3	0.67	Y	4	2	0
D	Unstable angina in last 3 months	7	7	1.43	I	1	1	5	6	7.5	1.67	I	1	1	4
E	Myocardial infarction within past 7 days	7	9	0.14	Y	0	0	7	6	9	0.17	Y	0	0	6
F	Recent myocardial infarction (> 7 days but fewer than 30 days)	7	8	0.43	Y	0	0	7	6	8	0.50	Y	0	0	6
G	Myocardial infarction (>30 days but fewer than 6 mos)	7	6	0.86	Y	0	4	3	6	6.5	1.00	Y	0	3	3
H	Old myocardial infarction (> 6 months)	7	3	1.00	Y	4	3	0	6	3.5	1.17	Y	3	3	0
I	Dementia	7	4	0.86	Y	3	4	0	6	3	0.83	Y	4	2	0
J	Chronic obstructive pulmonary disease with	7	3	0.86	Y	5	2	0	6	2.5	1.00	Y	4	2	0
K	Asthma with hospitalization or emergency department visit within past one year	7	3	1.00	Y	5	2	0	6	2.5	1.17	Y	4	2	0
L	Bronchietasis with acute exacerbation within past 6 mos	7	2	1.00	Y	5	2	0	6	2	1.17	Y	4	2	0
M	Cirrhosis	7	3	1.00	Y	5	2	0	6	2.5	1.17	Y	4	2	0
N	Cardiomyopathy/heart failure/pulmonary edema with hospitalization or emergency department visit within one past year	7	4	1.14	I	3	3	1	6	5	1.33	I	2	3	1
O	Orthopnea	7	3	0.71	Y	4	3	0	6	3.5	1.00	Y	3	3	0
P	History of bleeding disorder	7	3	0.71	Y	5	2	0	6	3	0.83	Y	4	2	0
Q	History of adverse effect from anticoagulation in past 3 months	7	3	0.86	Y	5	2	0	6	2.5	1.00	Y	4	2	0
R	Diabetes mellitus (Type 2), requiring insulin	7	3	0.43	Y	6	1	0	6	3	0.50	Y	6	0	0

		HOSPITAL OUTPATIENT DEPT							AMBULATORY SURGERY CENTER						
	Patient Characterisitcs	#Resp	Median	Mean Dev	Agree?	<4	4-6	>6	#Resp	Median	Mean Dev	Agree?	<4	4-6	>6
S	Diabetes mellitus (Type 2), not requiring insulin	7	2	0.43	Y	7	0	0	6	2	0.50	Y	6	0	0
T	Chronic renal failure, requiring hemodialysis	6	3	1.33	Y	4	2	0	5	3	1.60	Y	3	2	0
U	Chronic renal failure, not requiring hemodialysis	6	2.5	0.75	Y	5	1	0	5	2	0.80	Y	4	1	0
V	Aortic stenosis	6	3	1.17	Y	4	2	0	5	3	1.40	Y	3	2	0
W	Sleep Apnea	6	3	1.00	Y	4	2	0	5	3	1.20	Y	3	2	0
X	Thyrotoxicosis within past 6 months	6	2.5	1.25	Y	4	2	0	5	2	1.40	Y	3	2	0
Y	Malignant hypertension	7	9	0.00	Y	0	1	6	6	9	0.00	Y	0	0	6
Z	Primary pulmonary hypertension	7	4	0.71	I	2	4	1	6	4	0.83	I	1	4	1
AA	Mobitz Type 2 Atrioventricular block	7	3	0.71	Y	5	2	0	6	3	0.83	Y	4	2	0
AB	Anomalous atrioventricular excitation	7	3	0.57	Y	5	2	0	6	3	0.67	Y	4	2	0
AC	Paroxysmal Supraventricular Tachycardia	7	3	0.86	Y	4	3	0	6	3.5	1.00	Y	3	3	0
AD	Paroxysmal Ventricular Tachycardia	7	5	0.86	Y	1	6	0	6	5	0.83	Y	1	5	0
AE	Patient with Automatic Implanted Cardioverter	6	3	1.17	Y	4	2	0	5	3	1.40	Y	3	2	0
AF	Atrial fibrillation	7	3	0.29	Y	7	0	0	6	3	0.33	Y	6	0	0
AG	Atrial flutter in past 6 months	7	3	0.71	Y	5	2	0	6	3	0.83	Y	4	2	0
AH	Persistent severe sinus bradycardia or sick sinus tachycardia-bradycardia syndrome	7	4	1.00	I	2	4	1	6	4.5	1.33	I	2	3	1
AI	Orthostatic Hypotension	7	2	0.43	Y	6	1	0	6	2	0.50	Y	5	1	0
AJ	Seizure disorder	7	3	0.43	Y	7	0	0	6	2.5	0.50	Y	6	0	0
AL	Myasthenia gravis	7	3	1.00	Y	5	2	0	6	2.5	1.17	Y	4	2	0
AM	Stroke > 30 days but < 6 months	7	3	1.14	Y	5	2	0	6	3	1.33	Y	4	2	0
AN	Barbiturate, chlordiazepoxide, diazepam, glutethimide, meprobamate, or methaqualone	7	2	0.43	Y	6	1	0	6	2	0.50	Y	5	1	0
AO	Opioid type dependence	7	2	0.43	Y	6	1	0	6	2	0.50	Y	5	1	0
AP	Alcohol abuse	7.195	2.7987	0.62	Y	5	2	0	6	2	0.67	Y	5	1	0

	Patient Characterisitcs	HOSPITAL OUTPATIENT DEPT								AMBULATORY SURGERY CENTER							
		#Resp	Median	Mean	Dev	Agree?	<4	4-6	>6	#Resp	Median	Mean	Dev	Agree?	<4	4-6	>6
AQ	Personal history of allergy to anesthetic agent	7	3	0.43		Y	7	0	0	6	2.5	0.50		Y	6	0	0
AR	Personal history of allergy to narcotic agent	7	2	0.57		Y	6	1	0	6	2	0.67		Y	5	1	0
AS	Personal history of allergy to analgesic agent	7	2	0.29		Y	7	0	0	6	2	0.33		Y	6	0	0
AT	History of shock due to anesthesia in which correct substance was properfly administered	7	4	1.00		Y	3	4	0	6	4	1.17		Y	2	4	0
AU	Anxiety	7	2	0.43		Y	6	1	0	6	2	0.50		Y	6	0	0
AV	Schizophrenic disorder	7	3	0.29		Y	7	0	0	6	3	0.33		Y	6	0	0
AW	Essential, Benign, or Drug-Related Tremor	7	2	0.29		Y	7	0	0	6	2	0.33		Y	6	0	0
AX	Abnormal head movements, Fasciculations, Spasms or Tremor Not Otherwise Specified	7	3	0.86		Y	4	3	0	6	3	1.00		Y	4	2	0
AY	Mechanical heart valve	6	3	0.33		Y	5	1	0	5	3	0.40		Y	4	1	0
BA	Un-operated eye has poor vision	7	3	0.43		Y	5	2	0	6	3	0.50		Y	5	1	0
BB	Subluxation of lens	6	5.5	0.67		Y	0	5	1	6	5.5	0.67		Y	0	5	1
BC	Recession of chamber angle	7	5	0.86		I	1	5	1	6	4.5	1.00		Y	1	5	0
BD	Pseudoexfoliation of lens capsule	7	5	0.71		I	1	5	1	6	5	0.83		Y	1	5	0
BE	Progressive high (degenerative) myopia/malignant myopia	7	5	0.86		I	1	5	1	6	4.5	1.00		Y	1	5	0
BF	Dislocation of lens	7	7	0.86		Y	0	3	4	6	6.5	1.00		Y	0	3	3
BG	History of ruptured globe	7	7	1.29		Y	0	2	5	6	7.5	1.50		Y	0	2	4
BH	History of open wound of adnexa	7	3	1.14		Y	4	3	0	6	2.5	1.33		Y	4	2	0
BI	Endothelial corneal dystrophy, including combined corneal dsystrophy, cornea guttata, and Fuch's endothelial dystrophy	7	3	0.57		Y	4	3	0	6	3	0.67		Y	4	2	0
BJ	Posterior synechiae	7	4	1.00		Y	3	4	0	6	3.5	1.17		Y	3	3	0
BK	History of vitrectomy	7	3	0.57		I	4	2	1	6	3	0.67		Y	4	2	0

SUMMARY OF CATARACT EXPERT PANEL RATINGS FOR PROCEDURE CHARACTERISTICS

		HOSPITAL OUTPATIENT DEPARTMENT																			
		NORMAL OR VERY LOW RISK							LOW-MODERATE RISK							MODERATE RISK						
	Procedure Characteristics	# Resp	Median	Mean Dev	Agree ?	<4	4-6	>6	# Resp	Median	Mean Dev	Agree ?	<4	4-6	>6	# Resp	Median	Mean Dev	Agree ?	<4	4-6	>6
A	Cataract surgery requiring general anesthesia	6	8	1.17	Y	0	1	5	6	7.5	1.17	Y	0	1	5	6	7	1.00	I	1	1	4
B	Removal of lens material;intracapsular (66920)	6	9	0.83	Y	0	1	5	6	9	0.83	Y	0	1	5	6	8.5	1.17	Y	0	1	5
C	Removal of lens material; intracapsular, for dislocated lens	6	9	0.83	Y	0	1	5	6	9	0.83	Y	0	1	5	6	8.5	1.17	Y	0	1	5
D	Intracapsular cataract extraction with insertion of intraocular lens prothesis (one stage procedure 66983)	6	9	0.83	Y	0	1	5	6	9	0.83	Y	0	1	5	6	8.5	1.17	Y	0	1	5
E	Removal of lens material; phacofragmentation technique (mechanical or ultrasonic), with aspiration (66850)	6	9	0.83	Y	0	1	5	6	9	0.83	Y	0	1	5	6	8.5	1.17	Y	0	1	5
F	Extracapsular cataract removal with insertion of intraocular lens prothesis (one stage procedure), manual or mechanical technique (66984)	6	9	0.83	Y	0	1	5	6	9	0.83	Y	0	1	5	6	8.5	1.17	Y	0	1	5
G	Removal of lens material;aspiration technique, one or more stages (66840)	6	9	0.83	Y	0	1	5	6	9	0.83	Y	0	1	5	6	8.5	1.17	Y	0	1	5
H	Removal of lens material; pars plana approach, with or without vitrectomy (66852)	6	8.5	2.17	Y	0	1	5	6	8.5	2.17	I	1	1	4	6	7.5	2.17	I	1	1	4
I	Removal of lens material;extracapsular (66940)	6	9	0.83	Y	0	1	5	6	9	0.83	Y	0	1	5	6	8.5	1.17	Y	0	1	5
J	Removal of implanted material, anterior segment of eye (65920)	6	9	0.83	Y	0	1	5	6	9	0.83	Y	0	1	5	6	8.5	1.17	Y	0	1	5
K	Expression of lens, linear, one or more stages (66915)	6	9	0.83	Y	0	1	5	6	9	0.83	Y	0	1	5	6	8.5	1.17	Y	0	1	5
L	Repositioning of intraocular lens prosthesis, requiring an incision, complication (66825)	6	9	0.83	Y	0	1	5	6	9	0.83	Y	0	1	5	6	8.5	1.17	Y	0	1	5
M	Procedure performed by resident	6	8.5	0.67	Y	0	1	5	6	8	0.50	Y	0	0	6	6	7	1.33	Y	0	3	3

	Procedure Characteristics	NORMAL or VERY LOW RISK							LOW-MODERATE RISK							MODERATE RISK						
		# Resp	Median	Mean Dev	Agree ?	<4	4-6	>6	# Resp	Median	Mean Dev	Agree ?	<4	4-6	>6	# Resp	Median	Mean Dev	Agree ?	<4	4-6	>6
A	Cataract surgery requiring general anesthesia	5	6	1.60	Y	0	3	2	5	6	1.40	I	1	2	2	5	3	1.40	Y	3	2	0
B	Removal of lens material;intracapsular (66920)	5	9	1.00	Y	0	1	4	5	9	1.00	Y	0	1	4	5	8	1.20	Y	0	1	4
C	Removal of lens material; intracapsular, for dislocated lens	5	9	1.00	Y	0	1	4	5	9	1.00	Y	0	1	4	5	8	1.20	Y	0	1	4
D	Intracapsular cataract extraction with insertion of intraocular lens prothesis (one stage procedure 66983)	5	9	1.00	Y	0	1	4	5	9	1.00	Y	0	1	4	5	8	1.20	Y	0	1	4
E	Removal of lens material; phacofragmentation technique (mechanical or ultrasonic), with aspiration (66850)	5	9	1.00	Y	0	1	4	5	9	1.00	Y	0	1	4	5	8	1.20	Y	0	1	4
F	Extracapsular cataract removal with insertion of intraocular lens prothesis (one stage procedure), manual or mechanical technique (66984)	5	9	1.00	Y	0	1	4	5	9	1.00	Y	0	1	4	5	8	1.20	Y	0	1	4
G	Removal of lens material;aspiration technique, one or more stages (66840)	5	9	1.00	Y	0	1	4	5	9	1.00	Y	0	1	4	5	8	1.20	Y	0	1	4
H	Removal of lens material; pars plana approach, with or without vitrectomy (66852)	5	5	1.40	Y	0	3	2	5	5	1.40	Y	0	3	2	5	5	1.20	Y	0	3	2
I	Removal of lens material;extracapsular (66940)	5	9	1.00	Y	0	1	4	5	9	1.00	Y	0	1	4	5	8	1.20	Y	0	1	4
J	Removal of implanted material, anterior segment of eye (65920)	5	9	1.00	Y	0	1	4	5	9	1.00	Y	0	1	4	5	8	1.20	Y	0	1	4
K	Expression of lens, linear, one or more stages (66915)	5	9	1.00	Y	0	1	4	5	9	1.00	Y	0	1	4	5	8	1.20	Y	0	1	4
L	Repositioning of intraocular lens prosthesis, requiring an incision, complication (66825)	5	9	1.00	Y	0	1	4	5	9	1.00	Y	0	1	4	5	8	1.20	Y	0	1	4
M	Procedure performed by resident	5	9	0.60	Y	0	0	5	5	8	0.60	Y	0	0	5	5	6	0.60	Y	0	4	1

SUMMARY OF CATARACT EXPERT PANEL RATINGS FOR PATIENT OUTCOMES

	CATARACT OUTCOMES	PREVENTABLE							SEVERITY						
		# Resp	Median	Mean Dev	Agree?	<4	4-6	>6	#Resp	Median	Mean Dev	Agree?	<4	4-6	>6
A	Arrhythmia	6	3	1.00	I	4	1	1	6	5	0.50	Y	1	5	0
B	Capsule rupture or posterior capsule tear	6	5.5	1.17	I	1	3	2	6	4	0.83	I	1	4	1
C	New or Worsening Congestive heart failure	6	6	1.50	N	2	2	2	6	7	0.67	Y	0	1	5
D	Persistent cystoid macular edema (Diabetic vs. non-diabetic)	5	5	0.80	Y	0	3	2	5	6	0.80	Y	0	4	1
E	Death	6	5.5	1.17	Y	0	4	2	6	9	0.00	Y	0	0	6
F	Endophthalmitis	5	7	0.80	Y	0	2	3	6	8.5	0.50	Y	0	0	6
G	Hypertension	6	6	0.50	Y	0	5	1	6	4	1.33	I	2	3	1
H	Hypotension	6	5	1.00	Y	0	4	2	6	5	0.33	Y	0	6	0
I	Iris prolapse	6	8	0.33	Y	0	1	5	6	5	1.00	Y	0	4	2
J	Myocardial infarction	6	4	1.17	I	2	3	1	6	9	0.50	Y	0	0	6
K	Retained nuclear fragment (posterior chamber vs. anterior chamber)	6	8	1.00	Y	0	2	4	6	5.5	0.50	Y	0	6	0
L	Ocular hypertension	6	6	0.50	Y	0	5	1	6	4	0.67	Y	1	5	0
M	Persistent iridocyclitis	6	6	0.67	Y	0	4	2	6	6	0.50	Y	0	5	1
N	Poor ocular motility, excluding cranial VII palsy	6	6	0.67	Y	0	4	2	5	5	0.40	Y	0	5	0
O	Retinal break	6	4.5	1.33	Y	2	4	0	7	7	1.00	I	1	2	4
P	Retinal detachment (complicated versus uncomplicated surgery)	6	4.5	1.17	Y	2	4	0	7	8	0.29	Y	0	0	7
Q	Stroke	6	4	1.67	I	3	2	1	7	8	0.29	Y	0	0	7
R	Wound dehiscence	7	6	1.00	I	1	3	3	7	7	0.43	Y	0	1	6
S	Wound leak	7	8	0.43	Y	0	1	6	6	6.5	0.67	Y	0	3	3
T	Aspiration pneumonia	5	7	2.20	N	2	0	3	6	7	0.33	Y	0	0	6
U	Respiratory Failure From Surgery	5	5	1.60	I	2	2	1	6	8	0.67	Y	0	1	5
V	Hyphema	6	6.5	0.67	Y	0	3	3	6	5	0.67	Y	0	6	0
W	Persistent Corneal Edema	6	7	0.50	Y	0	1	5	6	7	0.33	Y	0	1	5
X	Vitreous Loss	6	6.5	1.00	I	1	2	3	6	5.5	1.00	Y	0	4	2
Y	Secondary Glaucoma	6	5.5	0.83	Y	0	4	2	5	6	0.40	Y	0	5	0
Z	Dislocated Ocular Lenses	6	7.5	0.83	Y	0	1	5	6	5.5	0.83	Y	0	4	2
AA	Iris/pupil deformation	6	7	0.67	Y	0	1	5	6	5	0.67	Y	1	5	0

APPENDIX D. EXPERT PANEL ON COLONOSCOPY

February 2, 2004

Dr. Ron Fogel
Division of Gastroenterology
Henry Ford Hospital
2799 West Grand Blvd.
Detroit, Ml 48202

Dr. David A. Lieberman, M.D.
Portland VA Medical Center
3710 SW US Veterans Hospital Rd.
Portland, OR 97201

Ms. Pat Maher RN CGRN
Saint Joseph Health Center Endoscopy
300 First Capital Drive
Saint Charles, MO 63301

Dr. Martin C. Mahoney, MD, Ph.D., FAAFP
Chair, Clinical Prevention
Division of Cancer Prevention & Population Sciences
Roswell Park Cancer Institute
Elm & Carlton Streets
Buffalo, NY 14263

Dr. Peter M. Pardoll
Center for Digestive Disease
1609 Pasadena Ave., South Suite 3M
St. Petersburg, FL 33707

Dr. Bart Pope
LSUMC Shreveport
PO Box 33932
Shreveport, LA 71130-3932

Facilitator: Dr. Steven Asch, RAND

Dr. Douglas K. Rex, M.D.
Indiana University Medical Center
550 North University Blvd., #2300
Indianapolis, IN 46202

Dr. Allison Rosen, MD
Division of General Medicine and Primary Care
Beth Israel Deaconess Medical Center
330 Brookline Avenue, Rose 130
Boston, MA 02215

Dr. Anthony Senagore
Cleveland Clinic Foundation -- A-30
9500 Euclid Avenue
Cleveland, OH 44195-0001

COLONOSCOPY RATING FORMS AND EXPERT PANEL PROCESS

A. Outcomes/complications, round “0” (first-round): preventability and severity. Panelist provided ratings prior to the panel discussion and faxed their responses. The panelists’ responses were entered into a database.

B. Outcomes/complications, round “1” (second-round) with rating summary: preventability and severity. Panelists received the rating form and a summary of the scores for each indicator. Panelists completed the rating form again during the panel discussion.

C. Patient characteristics: risk. Panelists completed this rating form during the panel discussion.

D. Procedure characteristics: appropriateness across outpatient settings. Panelists briefly discussed procedure characteristics, but completed the rating form after the panel discussion because of time constraints.

SUMMARY OF COLONOSCOPY EXPERT PANEL RATINGS FOR PATIENT CHARACTERISTICS

		HOSPITAL OUTPATIENT DEPT															
	Patient Characteristics	**# Resp**	**Median**	**Mean Dev**	**Agree?**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**<4**	**4-6**	**>6**
A	Age > 70 years	9	1	0.33	Y	6	3	0	0	0	0	0	0	0	9	0	0
B	Age > 85 years	9	2	0.22	Y	2	6	1	0	0	0	0	0	0	9	0	0
C	Stable angina	9	2	0.22	Y	3	6	0	0	0	0	0	0	0	9	0	0
D	Unstable angina in last 3 months	9	3	0.67	Y	1	2	4	2	0	0	0	0	0	7	2	0
E	Myocardial infarction within past 7 days	9	4	0.89	I	0	0	3	3	1	1	1	0	0	3	5	1
F	Recent myocardial infarction (> 7 days but fewer than 30 days)	9	3	1.00	Y	0	3	2	2	1	1	0	0	0	5	4	0
G	Myocardial infarction (>30 days but fewer than 6 months)	9	3	0.67	Y	1	3	3	2	0	0	0	0	0	7	2	0
H	Old myocardial infarction (> 6 months)	8	2	0.25	Y	3	5	0	0	0	0	0	0	0	8	0	0
I	Dementia	8	2	0.88	Y	3	2	2	0	1	0	0	0	0	7	1	0
J	Chronic obstructive pulmonary disease with hospitalization or emergency department visit within past one year	8	2	0.50	Y	0	5	2	1	0	0	0	0	0	7	1	0
K	Asthma with hospitalization or emergency department visit within	8	2	0.13	Y	1	7	0	0	0	0	0	0	0	8	0	0
L	Bronchietasis with acute exacerbation within past 6 months	8	2	0.50	Y	0	5	2	1	0	0	0	0	0	7	1	0
M	Cirrhosis	8	1.5	1.06	Y	4	1	2	0	1	0	0	0	0	7	1	0
N	Cardiomyopathy/heart failure/pulmonary edema with hospitalization or emergency department visit within past one year	8	3	0.50	Y	0	3	3	2	0	0	0	0	0	6	2	0
O	Orthopnea	9	3	1.00	I	0	1	4	3	0	0	0	1	0	5	3	1
P	History of bleeding disorder	9	3	0.67	Y	1	3	4	0	1	0	0	0	0	8	1	0
Q	History of adverse effect from anticoagulation in past 3 months	9	2	0.56	Y	2	4	3	0	0	0	0	0	0	9	0	0
R	Diabetes mellitus (Type 2), requiring insulin	9	1	0.33	Y	6	3	0	0	0	0	0	0	0	9	0	0
S	Diabetes mellitus (Type 2), not requiring insulin	4	1.5	0.38	Y	2	2	0	0	0	0	0	0	0	4	0	0
T	Chronic renal failure, requiring hemodialysis	9	2	0.67	Y	4	3	1	1	0	0	0	0	0	8	1	0
U	Chronic renal failure, not requiring hemodialysis	9	2	0.44	Y	4	4	1	0	0	0	0	0	0	9	0	0
V	Aortic stenosis	9	2	0.78	Y	3	3	1	2	0	0	0	0	0	7	2	0
W	Malnutrition	9	2	0.33	Y	4	5	0	0	0	0	0	0	0	9	0	0
X	Thyrotoxicosis within past 6 months	9	2	0.22	Y	3	6	0	0	0	0	0	0	0	9	0	0
Y	Malignant hypertension	9	3	1.67	N	1	2	2	0	2	0	1	1	0	5	2	2
Z	Primary pulmonary hypertension	9	3	1.00	Y	1	2	2	2	2	0	0	0	0	5	4	0

		HOSPITAL OUTPATIENT DEPT															
	Patient Characteristics	**# Resp**	**Median**	**Mean Dev**	**Agree?**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**<4**	**4-6**	**>6**
AA	Mobitz Type 2 Atrioventricular block	9	2	0.44	Y	0	6	2	1	0	0	0	0	0	8	1	0
AB	Anomalous atrioventricular excitation including:accelerated, accessory ventricular pre-excitation, Wolff-Parkinson-White syndrome	9	2	0.33	Y	0	6	3	0	0	0	0	0	0	9	0	0
AC	Paroxysmal Supraventricular Tachycardia	9	2	0.22	Y	1	6	2	0	0	0	0	0	0	9	0	0
AD	Paroxysmal Ventricular Tachycardia	9	3	0.67	Y	0	3	4	0	2	0	0	0	0	7	2	0
AE	Patient with Automatic Implanted Cardioverter Defibrillator (AICD)	9	2	0.67	Y	1	4	3	1	0	0	0	0	0	8	1	0
AF	Atrial fibrillation	9	2	0.67	Y	4	3	2	0	0	0	0	0	0	9	0	0
AG	Atrial flutter in past 6 months	9	1	0.44	Y	5	3	1	0	0	0	0	0	0	9	0	0
AH	Persistent severe sinus bradycardia or sick sinus tachycardia-bradycaridia syndrome	9	3	1.11	I	0	4	3	0	1	0	0	1	0	7	1	1
AI	Orthostatic Hypotension	9	2	0.89	I	1	5	2	0	0	0	1	0	0	8	0	1
AJ	Seizure disorder	9	2	0.44	Y	4	5	0	0	0	0	0	0	0	9	0	0
AK	Myasthenia gravis	9	2	0.78	Y	4	3	1	0	1	0	0	0	0	8	1	0
AL	Stroke within past 6 months	9	2	0.56	Y	3	3	3	0	0	0	0	0	0	9	0	0
AM	Barbiturate, chlordiazepoxide, diazepam, glutethimide, meprobamate, or methaqualone dependence	9	2	0.44	Y	3	5	0	1	0	0	0	0	0	8	1	0
AN	Opioid type dependence	9	2	0.67	Y	3	5	0	0	0	1	0	0	0	8	1	0
AO	Alcohol abuse	9	2	0.44	Y	3	4	2	0	0	0	0	0	0	9	0	0
AP	Personal history of allergy to anesthetic agent	9	2	0.56	Y	2	4	3	0	0	0	0	0	0	9	0	0
AQ	Personal history of allergy to narcotic agent	9	2	0.22	Y	1	7	1	0	0	0	0	0	0	9	0	0
AR	Personal history of allergy to analgesic agent	9	2	0.11	Y	1	8	0	0	0	0	0	0	0	9	0	0
AS	History of shock due to anesthesia in which correct substance was properly administered	9	3	0.56	Y	0	3	5	0	1	0	0	0	0	8	1	0
AT	Anxiety	9	1	0.56	Y	5	3	1	0	0	0	0	0	0	9	0	0
AU	Schizophrenic disorder	9	2	0.67	Y	4	3	1	1	0	0	0	0	0	8	1	0
AV	Mechanical heart valve	9	1	0.56	Y	5	3	1	0	0	0	0	0	0	9	0	0
BA	History of partial bowel obstruction	9	2	0.44	Y	4	5	0	0	0	0	0	0	0	9	0	0
BB	History of complete bowel obstruction	9	2	0.44	Y	3	5	1	0	0	0	0	0	0	9	0	0
BC	History of colorectal cancer	9	2	0.44	Y	4	5	0	0	0	0	0	0	0	9	0	0
BD	History of prior GI workup (other GI procedures including other endoscopy or radiological GI studies	9	1	0.33	Y	5	4	0	0	0	0	0	0	0	9	0	0
BE	Inflammatory bowel disease	9	2	0.44	Y	4	5	0	0	0	0	0	0	0	9	0	0
BF	Melena	9	2	0.22	Y	1	7	1	0	0	0	0	0	0	9	0	0

		ASC															
	Patient Characteristics	**# Resp**	**Median**	**Mean Dev**	**Agree?**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**<4**	**4-6**	**>6**
AA	Mobitz Type 2 Atrioventricular block	9	2	0.56	Y	0	6	1	2	0	0	0	0	0	7	2	0
AB	Anomalous atrioventricular excitation including:accelerated, accessory ventricular pre-excitation, Wolff-Parkinson-White syndrome	9	3	0.44	Y	0	4	5	0	0	0	0	0	0	9	0	0
AC	Paroxysmal Supraventricular Tachycardia	9	2	0.56	Y	1	5	2	1	0	0	0	0	0	8	1	0
AD	Paroxysmal Ventricular Tachycardia	9	3	0.89	Y	0	3	4	0	1	1	0	0	0	7	2	0
AE	Patient with Automatic Implanted Cardioverter Defibrillator (AICD)	9	3	0.89	Y	1	3	4	0	0	1	0	0	0	8	1	0
AF	Atrial fibrillation	8	2	0.63	Y	3	3	2	0	0	0	0	0	0	8	0	0
AG	Atrial flutter in past 6 months	9	1	0.56	Y	5	3	1	0	0	0	0	0	0	9	0	0
AH	Persistent severe sinus bradycardia or sick sinus tachycardia-bradycaridia syndrome	9	3	1.33	I	0	3	3	0	2	0	0	1	0	6	2	1
AI	Orthostatic Hypotension	9	2	1.22	I	1	4	2	0	1	0	1	0	0	7	1	1
AJ	Seizure disorder	9	2	0.44	Y	4	5	0	0	0	0	0	0	0	9	0	0
AK	Myasthenia gravis	9	2	0.89	Y	4	3	1	0	1	0	0	0	0	8	1	0
AL	Stroke within past 6 months	9	2	0.67	Y	3	3	3	0	0	0	0	0	0	9	0	0
AM	Barbiturate, chlordiazepoxide, diazepam, glutethimide, meprobamate, or methaqualone dependence	9	2	0.67	Y	3	4	1	1	0	0	0	0	0	8	1	0
AN	Opioid type dependence	9	2	0.89	Y	3	4	1	0	0	1	0	0	0	8	1	0
AO	Alcohol abuse	9	2	0.56	Y	3	4	2	0	0	0	0	0	0	9	0	0
AP	Personal history of allergy to anesthetic agent	9	2	0.89	Y	2	3	2	2	0	0	0	0	0	7	2	0
AQ	Personal history of allergy to narcotic agent	9	2	0.33	Y	1	6	2	0	0	0	0	0	0	9	0	0
AR	Personal history of allergy to analgesic agent	9	2	0.22	Y	1	7	1	0	0	0	0	0	0	9	0	0
AS	History of shock due to anesthesia in which correct substance was properly administered	9	3	0.56	Y	0	2	5	1	1	0	0	0	0	7	2	0
AT	Anxiety	9	1	0.56	Y	5	3	1	0	0	0	0	0	0	9	0	0
AU	Schizophrenic disorder	9	2	0.78	Y	4	3	1	1	0	0	0	0	0	8	1	0
AV	Mechanical heart valve	9	1	0.56	Y	5	3	1	0	0	0	0	0	0	9	0	0
BA	History of partial bowel obstruction	9	2	0.44	Y	4	5	0	0	0	0	0	0	0	9	0	0
BB	History of complete bowel obstruction	9	2	0.44	Y	3	5	1	0	0	0	0	0	0	9	0	0
BC	History of colorectal cancer	9	1	0.44	Y	5	4	0	0	0	0	0	0	0	9	0	0
BD	History of prior GI workup (other GI procedures including other endoscopy or radiological GI studies	9	2	0.44	Y	4	5	0	0	0	0	0	0	0	9	0	0
BE	Inflammatory bowel disease	9	2	0.44	Y	0	6	2	1	0	0	0	0	0	8	1	0
BF	Melena																

		PHYSICIAN OFFICE														
		# Resp	Median	Mean Dev	Agree?	1	2	3	4	5	6	7	8	9	<4	4-6	>6
	Patient Characteristics																
A	Age > 70 years	9	1	0.89	Y	5	2	1	0	0	0	0	0	0	8	1	0
B	Age > 85 years	9	2	1.11	I	1	5	1	0	1	0	0	0	0	7	1	1
C	Stable angina	8	2	0.38	Y	1	5	2	0	1	0	1	0	0	8	0	0
D	Unstable angina in last 3 months	8	3.5	1.38	I	0	2	2	2	0	0	0	0	0	4	3	1
E	Myocardial infarction within past 7 days	9	6	1.78	I	0	1	0	0	1	0	0	1	0	1	4	4
F	Recent myocardial infarction (> 7 days but fewer than 30 days)	9	4	1.44	N	0	1	1	4	3	1	1	1	2	2	5	2
G	Myocardial infarction (>30 days but fewer than 6 months)	9	3	1.44	N	0	3	4	0	1	0	0	1	1	7	0	2
H	Old myocardial infarction (> 6 months)	8	2	0.38	Y	3	5	0	0	0	0	0	2	0	8	0	0
I	Dementia	8	2.5	1.75	I	2	2	1	1	0	0	0	0	0	5	2	1
J	Chronic obstructive pulmonary disease with hospitalization or emergency department visit within past one year	8	3	0.88	Y	0	2	3	1	1	0	0	1	0	5	3	0
K	Asthma with hospitalization or emergency department visit within	8	2	0.50	Y	0	5	2	1	2	0	0	0	0	7	1	0
L	Bronchietasis with acute exacerbation within past 6 months	8	3.5	1.00	Y	0	3	1	3	0	0	0	0	0	4	4	0
M	Cirrhosis	8	1.5	1.88	I	4	1	0	1	1	0	0	0	0	5	2	1
N	Cardiomyopathy/heart failure/pulmonary edema with hospitalization or emergency department visit within past one year	8	4.5	1.00	I	0	0	2	2	1	0	0	1	0	2	5	1
O	Orthopnea	9	5	1.44	I	0	0	1	3	3	0	1	0	0	1	6	2
P	History of bleeding disorder	9	4	1.67	N	0	1	2	3	2	1	0	1	1	3	4	2
Q	History of adverse effect from anticoagulation in past 3 months	9	3	0.89	Y	1	3	3	1	1	0	0	0	2	7	2	0
R	Diabetes mellitus (Type 2), requiring insulin	9	1	0.33	Y	6	3	0	0	1	0	0	0	0	9	0	0
S	Diabetes mellitus (Type 2), not requiring insulin	4	1.5	0.50	Y	2	2	0	0	0	0	0	0	0	4	0	0
T	Chronic renal failure, requiring hemodialysis	9	2	1.78	I	4	1	1	1	0	0	0	0	0	6	2	1
U	Chronic renal failure, not requiring hemodialysis	9	2	0.56	Y	4	4	1	0	0	1	1	0	0	9	0	0
V	Aortic stenosis	9	4	1.89	I	3	1	0	2	0	0	0	0	0	4	4	1
W	Malnutrition	9	2	0.78	Y	4	3	1	1	1	1	1	0	0	8	1	0
X	Thyrotoxicosis within past 6 months	9	2	0.67	I	3	4	1	1	0	0	0	0	0	8	1	0
Y	Malignant hypertension	9	5	2.00	I	1	1	1	1	0	0	0	0	0	3	4	2
Z	Primary pulmonary hypertension	9	5	1.11	N	0	2	0	1	2	1	0	1	1	2	6	1

		PHYSICIAN OFFICE															
	Patient Characteristics	**# Resp**	**Median**	**Mean Dev**	**Agree?**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**<4**	**4-6**	**>6**
AA	Mobitz Type 2 Atrioventricular block	9	3	1.00	Y	0	2	3	2	4	1	1	0	0	5	4	0
AB	Anomalous atrioventricular excitation including:accelerated, accessory ventricular pre-excitation, Wolff-Parkinson-White syndrome	9	3	0.56	Y	0	1	5	2	1	1	0	0	0	6	3	0
AC	Paroxysmal Supraventricular Tachycardia	9	3	0.78	Y	0	4	3	1	1	0	0	0	0	7	2	0
AD	Paroxysmal Ventricular Tachycardia	9	3	2.00	N	0	2	3	0	1	0	0	0	0	5	2	2
AE	Patient with Automatic Implanted Cardioverter Defibrillator (AICD)	9	5	2.33	N	1	1	2	0	2	0	0	0	2	4	2	3
AF	Atrial fibrillation	7	2	1.14	Y	3	1	2	0	2	0	1	0	2	6	1	0
AG	Atrial flutter in past 6 months	8	2	0.50	Y	3	4	1	0	1	0	0	0	0	8	0	0
AH	Persistent severe sinus bradycardia	9	4	2.11	N	0	2	1	2	0	0	0	0	0	3	3	3
	or sick sinus tachycardia-bradycaridia syndrome	9	3	1.33	I	0	4	2	0	1	0	1	0	2	6	2	1
AI	Orthostatic Hypotension	9	2	0.78	Y	4	2	3	0	2	0	1	0	0	9	0	0
AJ	Seizure disorder	9	2	1.44	I	4	2	2	0	0	0	0	0	0	8	0	1
AK	Myasthenia gravis	9	2	1.00	Y	3	2	3	0	0	0	0	0	1	8	1	0
AL	Stroke within past 6 months	9	2	1.00	I	1	5	2	0	1	0	0	0	0	8	0	1
AM	Barbiturate, chlordiazepoxide, diazepam, glutethimide, meprobamate, or methaqualone																
AN	Opioid type dependence	9	2	1.11	Y	1	5	1	0	0	0	0	1	0	7	2	0
AO	Alcohol abuse	9	2	1.22	Y	2	3	2	0	0	2	0	0	0	7	2	0
AP	Personal history of allergy to anesthetic agent	9	2	1.44	Y	2	3	0	2	1	1	0	0	0	5	4	0
AQ	Personal history of allergy to narcotic agent	9	2	0.78	Y	1	5	1	1	1	1	0	0	0	7	2	0
AR	Personal history of allergy to analgesic agent	9	2	0.44	Y	1	6	1	1	1	0	0	0	0	8	1	0
AS	History of shock due to anesthesia in which correct substance was properly administered	9	4	1.67	N	0	1	3	1	0	0	0	0	0	4	3	2
AT	Anxiety	9	1	0.56	Y	5	3	1	0	2	0	1	0	1	9	0	0
AU	Schizophrenic disorder	9	2	1.33	Y	4	2	2	0	0	0	0	0	0	8	0	1
AV	Mechanical heart valve	9	1	0.56	Y	5	3	1	0	0	0	0	1	0	9	0	0
BA	History of partial bowel obstruction	9	2	0.89	Y	3	3	1	2	0	0	0	0	0	7	2	0
BB	History of complete bowel obstruction	9	2	0.78	Y	3	2	4	0	0	0	0	0	0	9	0	0
BC	History of colorectal cancer	9	2	0.44	Y	4	5	0	0	0	0	0	0	0	9	0	0
BD	History of prior GI workup (other GI procedures including other endoscopy or radiological GI studies	9	1	0.44	Y	5	4	0	0	0	0	0	0	0	9	0	0
BE	Inflammatory bowel disease	9	2	0.56	Y	4	4	1	0	0	0	0	0	0	9	0	0
BF	Melena	9	4	1.33	I	0	1	2	2	0	0	0	0	0	3	5	1

SUMMARY OF COLONOSCOPY EXPERT PANEL RATINGS FOR PROCEDURE CHARACTERISTICS

		NORMAL OR VERY LOW RISK														
	Procedure Characteristics	# Resp	Median	Mean Dev	Agree ?	1	2	3	4	5	6	7	8	9	<4	4-6	>6
A	Colonoscopy with biopsy	9	9	0.56	Y	0	0	0	0	1	0	0	1	7	0	1	8
B	Colonoscopy for foreign body	9	9	0.56	Y	0	0	0	0	1	0	0	1	7	0	1	8
C	Colonoscopy for bleeding	9	9	0.56	Y	0	0	0	0	1	0	0	1	7	0	1	8
D	Colonoscopy with polypectomy NOT involving the ascending colon	9	9	0.56	Y	0	0	0	0	1	0	0	1	7	0	1	8
E	Colonoscopy with polypectomy involving the ascending colon	9	9	0.33	Y	0	0	0	0	0	0	1	1	7	0	0	9
F	Colonoscopy with snare	9	9	0.44	Y	0	0	0	0	0	1	0	1	7	0	1	8
G	Colonoscopy with stent	9	9	0.44	Y	0	0	0	0	0	1	0	1	7	0	1	8
I	Diagnostic colonoscopy with no additional procedures performed during procedure	9	9	0.56	Y	0	0	0	0	0	0	2	1	6	0	0	9
J	Colonoscopy with submucous injection	9	9	0.44	Y	0	0	0	0	0	0	1	2	6	0	0	9
K	Colonoscopy with lesion removal	9	9	0.33	Y	0	0	0	0	0	0	1	1	7	0	0	9
L	Colonoscopy with dilation of stricture under fluoroscopy	9	9	0.44	Y	0	0	0	0	0	0	1	2	6	0	0	9
M	Colonoscopy with dilation of stricture without fluoroscopy	9	9	1.22	I	0	0	1	0	1	0	0	1	6	1	1	7
N	Colonoscopy with endoscopic mucosal resection	9	9	0.44	Y	0	0	0	0	0	1	0	1	7	0	1	8
O	Colonoscopy performed by physician in training	9	9	0.11	Y	0	0	0	0	0	0	0	1	8	0	0	9

		HOSPITAL OUTPATIENT DEPARTMENT																											
		LOW-MODERATE RISK															MODERATE RISK													
	Procedure Characteristics	# Resp	Median	Mean Dev	Agree ?	1	2	3	4	5	6	7	8	9	<4	4-6	>6	# Resp	Median	Mean Dev	Agree ?	1	2	3	4	5	6	7	8	9	<4	4-6	>6
A	Colonoscopy with biopsy	9	9	0.33	Y	0	0	0	0	0	0	1	1	7	0	0	9	9	9	0.22	Y	0	0	0	0	0	0	0	2	7	0	0	9
B	Colonoscopy for foreign body	9	9	0.33	Y	0	0	0	0	0	0	1	1	7	0	0	9	9	9	0.22	Y	0	0	0	0	0	0	0	2	7	0	0	9
C	Colonoscopy for bleeding	9	9	0.33	Y	0	0	0	0	0	0	1	1	7	0	0	9	9	9	0.22	Y	0	0	0	0	0	0	0	2	7	0	0	9
D	Colonoscopy with polypectomy NOT involving the ascending colon	9	9	0.33	Y	0	0	0	0	0	0	1	1	7	0	0	9	9	9	0.22	Y	0	0	0	0	0	0	0	2	7	0	0	9
E	Colonoscopy with polypectomy involving the ascending colon	9	9	0.56	Y	0	0	0	0	1	0	0	1	7	0	1	8	9	9	0.67	Y	0	0	0	0	1	0	0	2	6	0	1	8
F	Colonoscopy with snare	9	9	0.44	Y	0	0	0	0	0	1	0	1	7	0	1	8	9	9	0.56	Y	0	0	0	0	0	1	0	2	6	0	1	8
G	Colonoscopy with stent	9	9	0.56	Y	0	0	0	0	1	0	0	1	7	0	1	8	9	9	1.22	Y	0	0	0	0	2	0	1	1	5	0	2	7
I	Diagnostic colonoscopy with no additional procedures performed during procedure	9	9	0.78	Y	0	0	0	0	1	0	1	1	6	0	1	8	9	9	1.11	Y	0	0	0	1	0	1	0	2	5	0	2	7
J	Colonoscopy with submucous injection	9	9	0.56	Y	0	0	0	0	0	1	0	2	6	0	1	8	9	9	0.78	Y	0	0	0	0	0	1	1	2	5	0	1	8
K	Colonoscopy with lesion removal	9	9	0.44	Y	0	0	0	0	0	1	0	1	7	0	1	8	9	9	0.67	Y	0	0	0	0	0	1	1	1	6	0	1	8
L	Colonoscopy with dilation of stricture under fluoroscopy	9	9	0.44	Y	0	0	0	0	0	0	1	2	6	0	0	9	9	9	0.44	Y	0	0	0	0	0	0	0	4	5	0	0	9
M	Colonoscopy with dilation of stricture without fluoroscopy	9	9	1.22	I	0	0	1	0	1	0	0	1	6	1	1	7	9	9	1.33	I	0	0	1	0	1	0	0	2	5	1	1	7
N	Colonoscopy with endoscopic mucosal resection	9	9	0.56	Y	0	0	0	0	0	1	1	0	7	0	1	8	9	9	0.56		0	0	0	0	0	1	0	2	6	0	1	8
O	Colonoscopy performed by physician in training	9	9	0.22	Y	0	0	0	0	0	0	1	0	8	0	0	9	9	9	0.78	Y	0	0	0	1	0	0	1	0	7	0	1	8

		PROCEDURE PERFORMED IN AN AMBULATORY SURGERY CENTER																													
		NORMAL or VERY LOW RISK																LOW-MODERATE RISK													
	Procedure Characteristics	# Resp	Median	Mean Dev	Agree ?	1	2	3	4	5	6	7	8	9	<4	4-6	>6	# Resp	Median	Mean Dev	Agree?	1	2	3	4	5	6	7	8	9	<4	4-6	>6
A	Colonoscopy with biopsy	9	9	0.22	Y	0	0	0	0	0	0	0	2	5	0	2	7	9	9	0.22	Y	0	0	0	0	0	0	0	2	5	0	2	7
B	Colonoscopy for foreign body	9	9	0.89	Y	0	0	0	0	1	0	1	2	3	0	3	6	9	9	1.00	Y	0	0	0	0	1	1	0	2	3	0	4	5
C	Colonoscopy for bleeding	8	9	0.63	Y	0	0	0	0	0	0	2	1	3	0	2	6	8	9	1.00	Y	0	0	0	0	1	0	1	1	3	0	3	5
D	Colonoscopy with polypectomy NOT involving the ascending colon	9	9	0.44	Y	0	0	0	0	0	0	1	2	4	0	2	7	9	9	0.78	Y	0	0	0	0	0	1	0	2	4	0	3	6
E	Colonoscopy with polypectomy involving the ascending colon	9	9	0.33	Y	0	0	0	0	0	0	1	1	5	0	2	7	9	9	0.33	Y	0	0	0	0	0	0	1	1	5	0	2	7
F	Colonoscopy with snare	9	9	0.33	Y	0	0	0	0	0	0	1	1	5	0	2	7	9	9	0.33	Y	0	0	0	0	0	0	1	1	5	0	2	7
G	Colonoscopy with stent	9	9	1.22	Y	0	0	0	2	0	0	0	1	4	0	4	5	9	9	1.33	I	0	0	1	1	0	0	0	1	4	1	3	5
I	Diagnostic colonoscopy with no additional procedures performed during procedure	9	9	0.33	Y	0	0	0	0	0	0	1	1	5	0	2	7	9	9	0.33	Y	0	0	0	0	0	0	1	1	5	0	2	7
J	Colonoscopy with submucous injection	9	9	0.67	Y	0	0	0	1	0	0	0	1	5	0	3	6	9	9	0.89	I	0	0	1	0	0	0	0	1	5	1	2	6
K	Colonoscopy with lesion removal	9	9	0.78	I	0	0	1	0	0	0	0	1	5	1	2	6	9	9	0.89	I	0	1	0	0	0	0	0	1	5	1	2	6
L	Colonoscopy with dilation of stricture under fluoroscopy	9	9	1.11	I	0	0	1	0	0	0	1	1	4	1	2	6	9	9	1.00	I	0	0	1	0	0	0	1	1	4	1	2	6
M	Colonoscopy with dilation of stricture without fluoroscopy	9	9	1.67	N	0	0	2	0	0	0	1	1	3	2	2	5	9	9	1.78	N	0	1	1	0	0	0	1	1	3	2	2	5
N	Colonoscopy with endoscopic mucosal resection	9	9	1.22	I	0	1	0	0	0	0	1	1	4	1	2	6	9	9	1.11	I	0	1	0	0	0	0	1	1	4	1	2	6
O	Colonoscopy performed by physician in training	9	9	0.56	Y	0	0	0	0	0	0	2	1	4	0	2	7	9	9	0.56	Y	0	0	0	0	0	0	2	1	4	0	2	7

		MODERATE RISK																NORMAL OR VERY LOW RISK													
	Procedure Characteristics	# Resp	Median	Mean Dev	Agree ?	1	2	3	4	5	6	7	8	9	<4	4-6	>6	# Resp	Median	Mean Dev	Agree ?	1	2	3	4	5	6	7	8	9	<4	4-6	>6
A	Colonoscopy with biopsy	9	9	0.44	Y	0	0	0	0	0	1	0	1	7	0	1	8	9	9	0.44	Y	0	0	0	0	0	0	1	2	6	0	0	9
B	Colonoscopy for foreign body	9	8	1.11	Y	0	0	0	0	2	0	0	3	4	0	2	7	9	8	2.67	N	1	1	1	0	0	1	0	1	4	3	1	5
C	Colonoscopy for bleeding	8	8.5	1.13	Y	0	0	0	1	0	0	1	1	5	0	1	7	9	7	2.44	N	1	1	1	0	1	0	1	1	3	3	1	5
D	Colonoscopy with polypectomy NOT involving the ascending colon	9	9	0.67	Y	0	0	0	0	1	0	0	2	6	0	1	8	9	9	2.78	N	1	0	1	0	0	1	0	1	5	2	1	6
E	Colonoscopy with polypectomy involving the ascending colon	9	9	0.33	Y	0	0	0	0	0	0	1	1	7	0	0	9	8	8.5	1.38	Y	0	0	0	0	2	0	1	1	4	0	2	6
F	Colonoscopy with snare	9	9	0.44	Y	0	0	0	0	0	0	1	2	6	0	0	9	8	8.5	1.50	Y	0	0	0	0	2	1	0	1	4	0	3	5
G	Colonoscopy with stent	9	8	1.78	I	0	1	0	1	0	0	1	1	5	1	1	7	8	5	3.25	N	2	1	1	0	0	0	1	2	1	4	0	4
I	Diagnostic colonoscopy with no additional procedures performed during procedure	9	9	0.56	Y	0	0	0	0	1	0	0	1	7	0	1	8	9	8	1.33	I	0	1	0	0	0	0	2	2	4	1	0	8
J	Colonoscopy with submucous injection	9	9	0.89	I	0	1	0	0	0	0	0	1	7	1	0	8	9	9	2.33	N	2	0	0	0	0	1	0	1	5	2	1	6
K	Colonoscopy with lesion removal	9	9	1.00	I	0	1	0	0	0	0	0	2	6	1	0	8	9	8	1.78	I	1	0	0	0	0	2	0	2	4	1	2	6
L	Colonoscopy with dilation of stricture under fluoroscopy	9	8	1.22	I	0	1	0	0	0	0	1	3	4	1	0	8	9	4	2.33	N	4	0	0	1	0	0	1	2	1	4	1	4
M	Colonoscopy with dilation of stricture without fluoroscopy	9	8	1.78	N	0	1	1	0	0	0	1	2	4	2	0	7	9	4	2.22	N	3	0	1	1	0	0	1	1	2	4	1	4
N	Colonoscopy with endoscopic mucosal resection	9	9	1.22	I	0	1	0	0	0	0	1	2	5	1	0	8	9	5	2.44	N	3	0	1	0	1	0	0	2	2	4	1	4
O	Colonoscopy performed by physician in training	9	9	0.56	Y	0	0	0	0	0	0	2	1	6	0	0	9	9	9	1.00	I	0	0	1	0	0	0	1	2	5	1	0	8

	Procedure Characteristics	PROCEDURE PERFORMED IN A PHYSICIAN OFFICE																												
		LOW-MODERATE RISK																	MODERATE RISK												
		# Resp	Median	Mean Dev	Agree ?	1	2	3	4	5	6	7	8	9	<4	4-6	>6		# Resp	Median	Mean Dev	Agree ?	1	2	3	4	5	6	7	8	9	<4	4-6	>6
A	Colonoscopy with biopsy	9	8	0.56	Y	0	0	0	0	0	0	1	4	4	0	0	9		9	7	1.67	I	0	0	1	1	1	0	2	2	2	1	2	6
B	Colonoscopy for foreign body	9	7	2.44	N	1	2	0	0	0	1	2	2	1	3	1	5		9	5	2.22	N	2	1	1	0	2	1	1	0	1	4	3	2
C	Colonoscopy for bleeding	8	7	2.25	N	0	2	0	0	0	2	0	2	2	2	2	4		8	5	2.75	N	2	0	2	0	0	0	3	0	1	4	0	4
D	Colonoscopy with polypectomy NOT involving the ascending colon	9	8	2.78	N	1	0	1	0	1	0	0	3	3	2	1	6		9	5	2.56	N	1	0	3	0	1	0	1	1	2	4	1	4
E	Colonoscopy with polypectomy involving the ascending colon	8	8	1.38	Y	0	0	0	0	3	0	0	3	2	0	3	5		8	5.5	1.88	N	0	1	1	0	2	1	1	1	1	2	3	3
F	Colonoscopy with snare	8	8	1.50	Y	0	0	0	0	3	0	0	2	3	0	3	5		8	6	2.00	I	0	1	0	1	2	0	1	2	1	1	3	4
G	Colonoscopy with stent	8	4	2.75	N	2	1	1	0	1	1	0	1	1	4	2	2		8	2.5	1.75	I	3	1	1	1	1	0	1	0	0	5	2	1
I	Diagnostic colonoscopy with no additional procedures performed during procedure	9	8	1.56	I	0	1	0	0	0	0	2	2	4	1	0	8		9	7	2.00	N	1	0	1	0	1	0	3	0	3	2	1	6
J	Colonoscopy with submucous injection	9	8	2.33	N	2	0	0	0	0	1	0	2	4	2	1	6		9	7	2.67	N	2	0	1	1	0	0	2	1	2	3	1	5
K	Colonoscopy with lesion removal	9	8	1.67	I	1	0	0	0	0	2	1	1	4	1	2	6		9	7	2.22	N	1	0	1	1	0	1	2	0	3	2	2	5
L	Colonoscopy with dilation of stricture under fluoroscopy	9	3	2.11	N	4	0	1	0	0	1	0	2	1	5	1	3		9	2	2.11	N	4	1	1	0	1	0	1	1	0	6	1	2
M	Colonoscopy with dilation of stricture without fluoroscopy	9	3	2.00	N	3	0	2	0	0	1	0	1	2	5	1	3		9	3	2.67	N	3	1	1	0	1	0	1	1	1	5	1	3
N	Colonoscopy with endoscopic mucosal resection	9	4	2.22	N	3	0	1	1	0	0	1	1	2	4	1	4		9	4	2.67	N	3	0	1	1	0	1	1	1	1	4	2	3
O	Colonoscopy performed by physician in training	9	8	1.33	I	0	0	1	0	1	0	1	3	3	1	1	7		9	6	1.33	I	0	0	1	0	3	1	3	0	1	1	4	4

SUMMARY OF COLONOSCOPY EXPERT PANEL RATINGS FOR PATIENT OUTCOMES

		PREVENTABLE														
		# Resp	Median	Mean Dev	Agree?	1	2	3	4	5	6	7	8	9	<4	4-6	>6
	Outcomes																
A	Abdominal pain	9	5	0.33	Y	0	0	0	0	6	3	0	0	0	0	9	0
B	Altered mental status	9	6	1.56	I	0	0	1	1	2	2	0	2	1	1	5	3
C	Arrhythmia	9	2	1.00	Y	2	3	2	1	1	0	0	0	0	7	2	0
D	Chest pain	9	4	1.44	Y	1	2	1	1	3	1	0	0	0	4	5	0
E	Death	9	8	1.56	I	0	1	0	1	0	0	1	3	3	1	1	7
F	Dyspnea	9	7	1.89	N	0	2	1	0	0	1	4	0	1	3	1	5
G	Hemorrhage	9	5	1.56	N	0	2	0	0	3	0	4	0	0	2	3	4
H	Hypertension	9	6	1.11	I	0	1	0	1	2	3	2	0	0	1	6	2
I	Hypotension	9	4	1.56	N	0	2	2	1	2	0	2	0	0	4	3	2
J	Hypoxia	9	5	2.11	N	0	1	3	0	1	1	0	3	0	4	2	3
K	Perforation	9	5	2.33	N	0	3	0	0	2	0	0	4	0	3	2	4
L	Post-polypectomy syndrome	9	5	1.56	I	0	3	0	0	3	2	0	1	0	3	5	1
A	Abdominal distension	9	5	0.78	I	0	0	1	0	4	3	1	0	0	1	7	1
B	Endocarditis	9	6	1.67	N	0	2	0	0	1	2	3	0	1	2	3	4
C	Sepsis and other infections	9	7	1.44	N	0	2	0	0	0	2	4	1	0	2	2	5
D	Small bowel obstruction	9	2	0.67	Y	1	5	2	0	1	0	0	0	0	8	1	0
E	Splenic rupture	9	5	2.22	N	0	3	0	0	2	0	1	3	0	3	2	4
F	Splenic trauma	9	5	2.22	N	0	3	0	0	2	0	1	3	0	3	2	4
G	Vasovagal reactions	9	4	1.56	I	1	2	1	1	3	0	1	0	0	4	4	1

		SEVERITY														
		# Resp	Median	Mean Dev	Agree?	1	2	3	4	5	6	7	8	9	<4	4-6	>6
	Outcomes																
A	Abdominal pain	7	2	0.29	Y	0	5	2	0	0	0	0	0	0	7	0	0
B	Altered mental status	8	2.5	1.00	Y	1	3	2	1	1	0	0	0	0	6	2	0
C	Arrhythmia	8	3.5	1.25	Y	0	2	2	1	2	1	0	0	0	4	4	0
D	Chest pain	7	6	1.29	I	0	0	2	0	1	3	0	1	0	2	4	1
E	Death	8	9	0.00	Y	0	0	0	0	0	0	0	0	8	0	0	8
F	Dyspnea	8	4	1.13	N	0	0	2	3	1	0	2	0	0	2	4	2
G	Hemorrhage	8	6.5	1.00	Y	0	0	0	0	3	1	3	1	0	0	4	4
H	Hypertension	8	3	1.50	N	0	2	3	1	0	0	1	1	0	5	1	2
I	Hypotension	8	6.5	1.50	I	0	0	1	1	1	1	2	2	0	1	3	4
J	Hypoxia	8	7	0.75	Y	0	0	0	0	1	0	4	2	1	0	1	7
K	Perforation	8	9	0.63	Y	0	0	0	0	0	1	0	2	5	0	1	7
L	Post-polypectomy syndrome	8	7	0.88	Y	0	0	0	0	1	2	2	3	0	0	3	5
A	Abdominal distension	8	4	0.88	I	0	0	2	4	1	0	0	1	0	2	5	1
B	Endocarditis	8	8	0.44	Y	0	0	0	0	0	0	0	4	3	0	0	7
C	Sepsis and other infections	7	8	0.57	Y	0	0	0	0	0	1	2	4	0	0	1	6
D	Small bowel obstruction	8	7	0.88	Y	0	0	0	0	0	3	2	2	1	0	3	5
E	Splenic rupture	7	9	0.29	Y	0	0	0	0	0	0	0	2	5	0	0	7
F	Splenic trauma	7	8	0.43	Y	0	0	0	0	0	0	0	4	3	0	0	7
G	Vasovagal reactions	8	5	1.38	Y	0	0	0	3	2	1	0	1	1	0	6	2

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